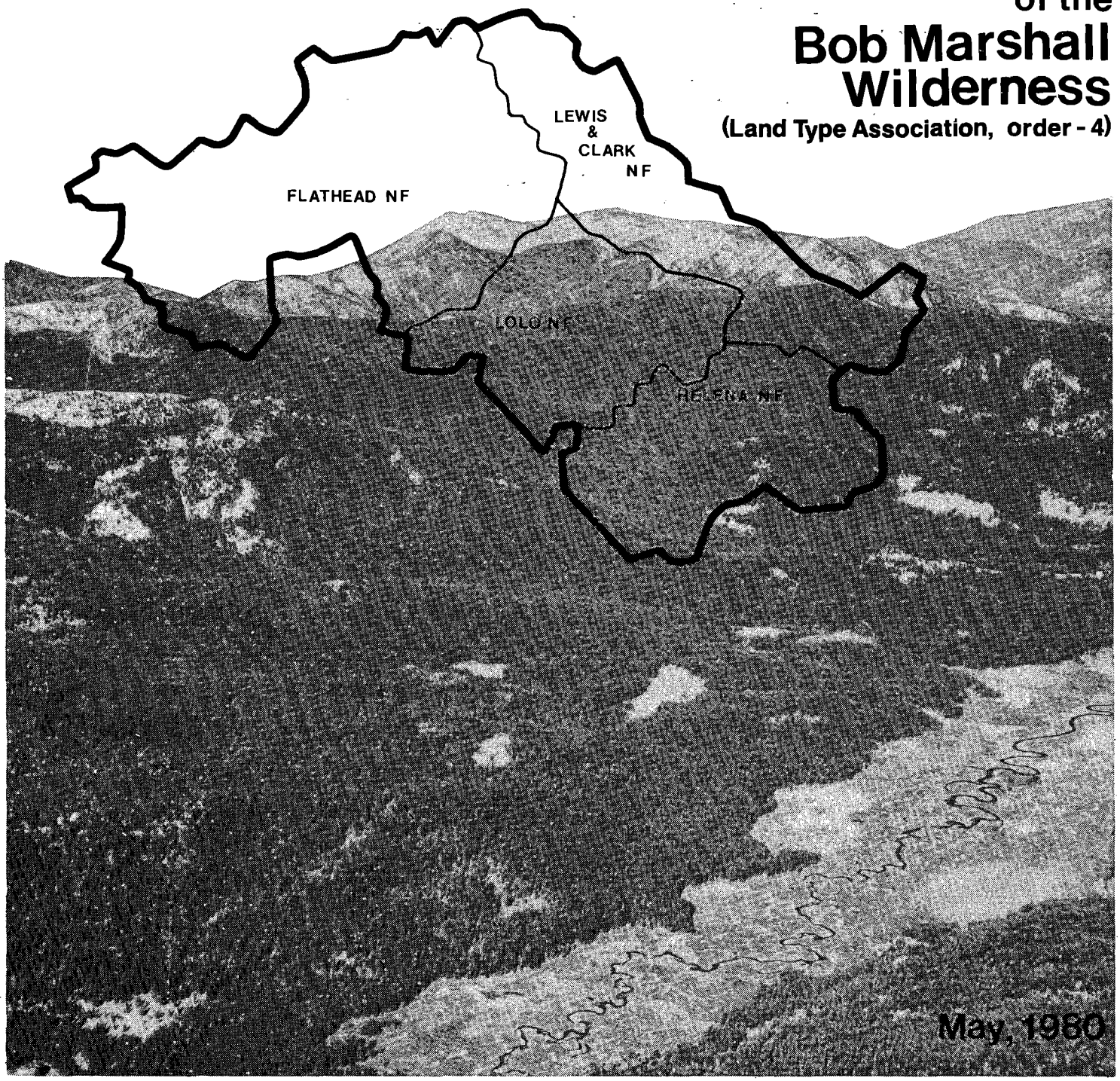
United States
Department of
Agriculture

Forest Service

**Flathead, Lolo,
Lewis & Clark,
and Helena
National Forests**

Land System Inventory of the Scapegoat and Danaher portion of the Bob Marshall Wilderness

(Land Type Association, order - 4)



May, 1980

Acknowledgements are due the following:

For logistics, support and travel arrangements while making this inventory:

Robert Gibson, Planning Staff Officer, Flathead National Forest;

John Robinson, Fire Control Officer, Flathead National Forest;

Dave Owen, District Ranger - Spotted Bear, Flathead National Forest;

Fred Flint, Wilderness Ranger - Spotted Bear, Flathead National Forest.

Ron Mellem, Cartographic Technician, Flathead National Forest, for stereo plotter work and map compilation.

Stan Bain, Photogrammetry, Flathead National Forest, for oblique photos characterizing the Land Type Associations.

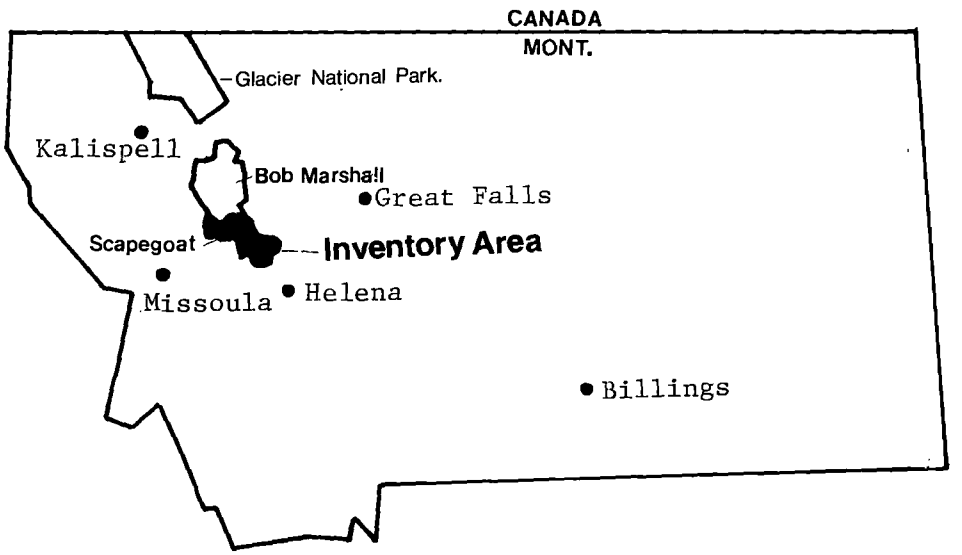
Carl Hansen, Kalispell Weekly News
JoAnn Speelman, Missoulian

Jack Losensky III, Interdisciplinary Planner, Lolo National Forest, for review of draft material prepared by Danny On.

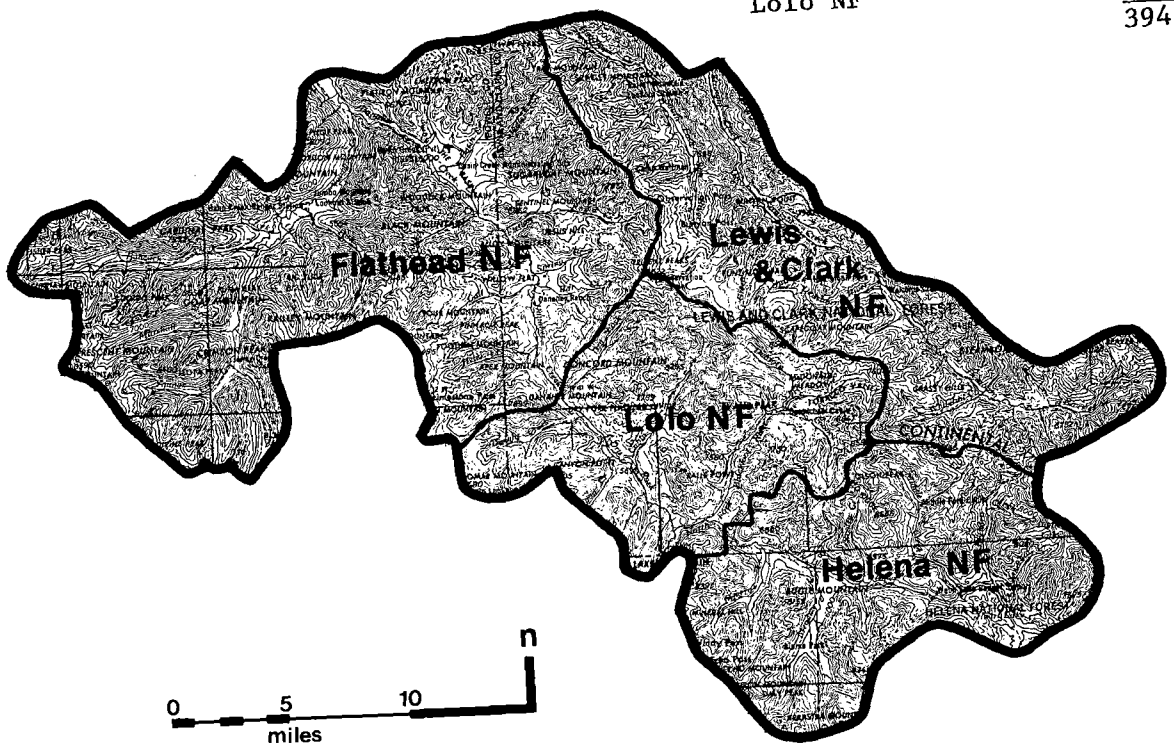
Special Thanks to William C. Fisher, National Forest Fire Lab, Missoula, Montana, and Sonny Stieger, Fire Management Specialist, Helena National Forest, for the review of this document.

Herbert Holdorf	Albin Martinson	Danny On
Soil Scientist	Soil Scientist	Silviculturist
Lewis & Clark NF	Flathead NF	Flathead NF

Vicinity Map



Flathead NF	-	166,145 acres
Helena NF	-	133,890 acres
Lewis & Clark NF	-	53,250 acres
Lolo NF	-	40,960 acres
		394,245 acres



INTRODUCTION

This inventory of landforms, soils and habitat types within the Scapegoat Wilderness and Danaher portion of the Bob Marshall Wilderness is an Order 4 Land Type Association as defined in Land System Inventory publication by USDA, Forest Service - Northern Region, dated July 1976 (R1-76-20). Mapping units are designed to produce analysis units with similar response to wilderness management. The principal management practice considered is fire management, but properties influencing wildlife habitat, watershed behavior, and wilderness recreation were also considered.

The map was prepared during the summer of 1978, by delineating landform and vegetative patterns visible on one inch equals one mile scale photography. The landform, soil properties and habitat type of these landscape units were then characterized in the field. Approximately 30 man-days of soil scientist and plant ecologist time were devoted to field characterization. Additional data from similar lands previously mapped at the most intensive land type level on adjacent areas of the Flathead, Lewis and Clark and Helena National Forests was extrapolated into the study area to characterize the mapping units.

This report covers nearly 400,000 acres of the Scapegoat Wilderness and the Danaher portion of the Bob Marshall Wilderness. This Land Type Association mapping legend and these soil, vegetation and fire behavior interpretations will cover the complete Bob Marshall, Great Bear and Mission Mountain Wildernesses, for an additional 925,000 acres. Premapping of these areas will be completed in 1980, and field checking will be completed in 1981 and 1982.

Low elevation flood plains were subdivided into three units. The first includes tree-covered stream bottoms with low fire occurrence (LTA I). The second unit has wet meadows with low to moderate fire occurrence (LTA Ia). A third subdivision includes the low terraces with mixed grasslands on coarse soils and timber patches on fine-textured soil (LTA Ib).

High elevation glacial tills (LTA II) occur in cirque basins and are characterized by low fire occurrence, heavy fuels and a high precipitation zone.

Low elevation glacial tills (LTA III) have a moderate fire occurrence, very heavy fuels, and can be sediment producers. These were further subdivided into silty and clayey parent materials on slightly different landforms (LTA IIIa).

Slump lands (LTA IV) are historic land failures. These units have a low to very low fire occurrence, very heavy fuels and are a high sediment source.

Residual soils (LTA V) occur on mountain slopes. This group is subdivided into units based on aspect, elevation, vegetation and stream dissection. High elevation ridges in high precipitation zones require long periods of time for revegetation after a fire (LTA Va). Forested cool aspect units have a low to moderate fire occurrence with large fuel accumulations (LTA Vb and Vc). Forested and grassland warm aspect units have moderate to high fire occurrence, with low to moderate fuel accumulations (LTA Vd and Ve). Further divisions are based on the degree of stream dissection which will influence fire behavior.

Peaks and alpine ridges (LTA VI) are sparsely vegetated rockland, in a high precipitation zone, with low fuel accumulation and a long recovery time.

Breaklands are steep slopes that are subdivided into cool (LTA VII) and warm (LTA VIII) aspects. Cool aspect breaklands are characterized by low fire occurrence and high fuel concentrations, usually in a high sediment delivery zone. Warm aspect breaklands have a moderate fire occurrence, low to moderate fuel accumulations and long vegetative recovery time due to thin soils on hot steep slopes.

The level of accuracy and reliability of mapping is considered adequate for the decisions made in wilderness planning. However, the map should not be used as a source for site-specific data occasionally required for administration of heavily used camp areas, recreation stock pastures, or the trail system. These require additional on-the-ground investigations.

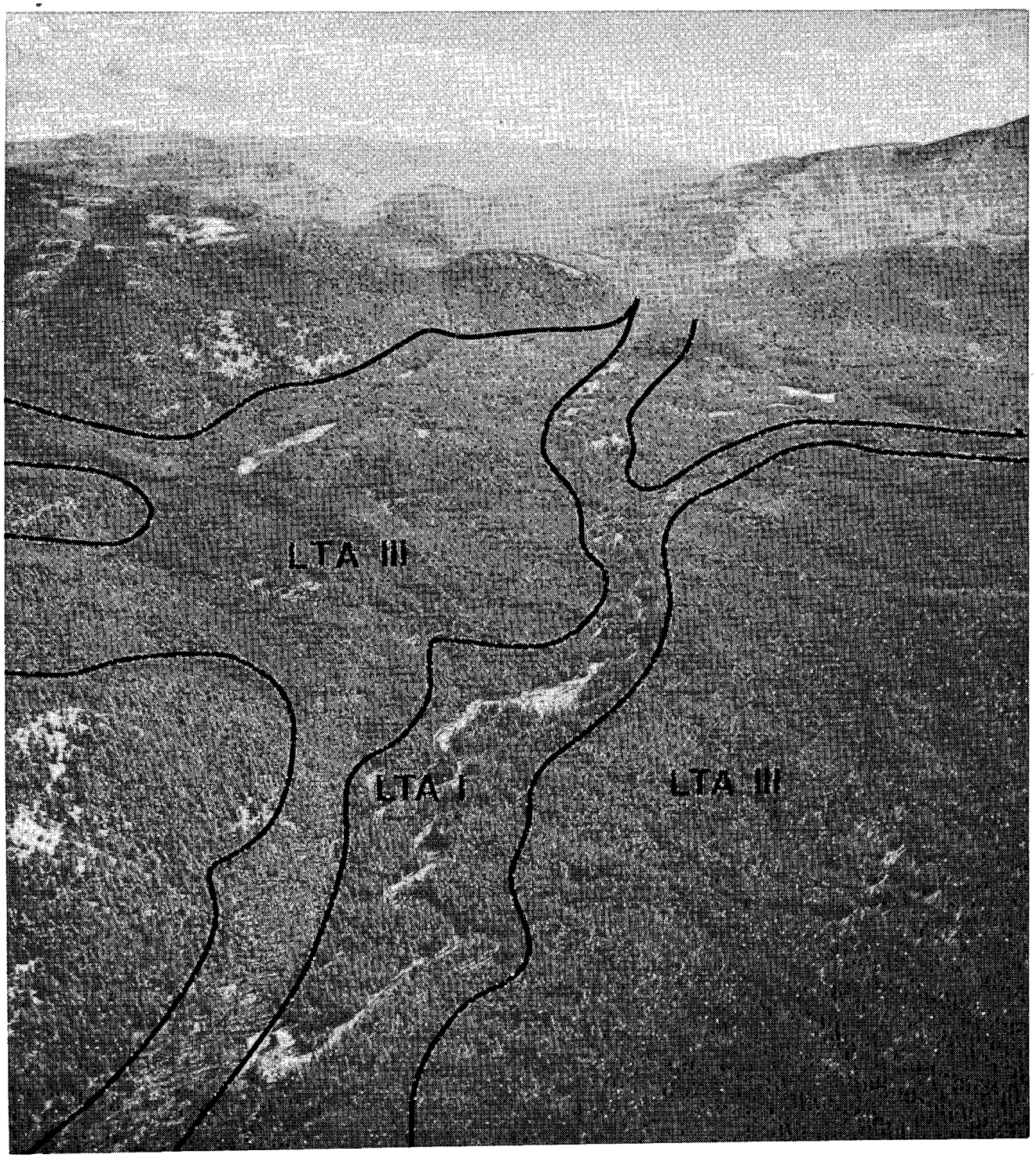
Footnotes and references are found at the end of each section in this report rather than in a bibliography section, because this report is the compilation of several authors.

DANAHER - SCAPEGOAT

LAND TYPE ASSOCIATION LEGEND

Symbol	Name of Mapping Unit
I	Forested Flood Plains
Ia	Wet, Grass-sedge Meadows
Ib	Grass & Forested Stream Terraces
II	Glacial Cirque Basins
III	Forested Ground Moraine
IIIa	Forested Steep Lateral Moraine
IV	Slump Land
Va	Forested High Elevation Ridges
Vb	Forested Smooth Residual Slopes
Vc	Forested Moderately Dissected Residual Slopes
Vd	Forested and Grassland Smooth Residual Slopes
VI	Peaks and Alpine Ridges - Sparsely Vegetated Rock Land
VII	Forested, Cool Aspect Break Lands
VIII	Forested, Warm Aspect Break Lands

East Fork Of The North Fork Of The Blackfoot River



LTA I : Forested Flood Plain
LTA III: Forested Glacial Ground Moraine

Forested Flood Plains

LTA I

Nearly level to gently sloping low flood plains and associated glacial stream terraces supporting coniferous forest vegetation. Streams are 3rd to 6th order. Elevations range from 4,500 to 5,500 feet M.S.L. Precipitation ranges from 25 to 35 inches with about 40 to 60 percent coming as snow. The lesser amount is at the lower elevations. Fluctuating water tables subirrigate deep rooted trees and shrubs on much of this land type association. Most areas are subject to spring flooding. This mapping unit occurs as the lowest component in the landscape, hence accumulates cold air from surrounding areas. Late spring and early summer frosts are common. Temperature inversions often trap smoke in the valleys, especially in the fall.

Vegetation is principally mixed lodgepole pine, spruce and subalpine fir forest. Cottonwood and willow occur as small inclusions on wet areas. Stands are frequently uneven aged.

Dominant habitat types include ABLA/LIBO and PICEA/LIBO on the better drained soils. PICEA/SMST and ABLA/GATR occur on the somewhat poorly drained silty soils. PICEA/EQAR occurs on the poorly drained soils with the water table at or near the surface during most of the growing season.

This land type association is estimated to contain 60 percent PICEA or ABLA/LIBO, 30 percent PICEA/SMST or ABLA/GATR and 10 percent PICEA/EQAR occurring in complex patterns depending upon depth to water table.

The soils are developed in parent materials ranging from silty lacustrine and alluvium to alluvial sands and gravels. Included are small areas of glacial tills, outwash terraces and grass meadows in old beaver ponds. The well drained soils are mostly loamy profiles over stratified sand and gravel and are classified as Fluvents. The somewhat poorly drained soils are loamy or silty profiles over stratified sand and gravels with a seasonal water table. They are classified as Aquents and Aquepts. The poorly drained soils are mostly silty soils with a dark surface, classified as Aquolls and have ground water at or near the surface most of the year. Grass meadows have a peat surface and are Histic Integrades.

These soils have a range in productivity due to the complexity of soils and depth to water table. Trees are subject to windthrow due to shallow or wet soils; however, topographic position and multi-storied stands minimize this hazard. Sediment production is low and limited to streamside erosion. Most streams have a gravel bottom.

This mapping unit is identified on the aerial photos by topographic position, stream channels and riparian vegetation.

This land type association is assigned to fire group 9. All included habitat types were assigned to this group by Clayton, except for PICEA/LIBO. In this unit, PICEA/LIBO behaves similarly to ABLA/LIBO. Clayton's description of stand structure and succession for this fire behavior group are consistent with observations of this land type association.

Erosion hazards are low and vegetative recovery following fire is rapid.

Danaher Basin - Bar Creek

LTA Ia : Wet, Grass - Sedge Meadows

LTA Ib : Grass & Forested Stream Terraces

LTA III : Forested Glacial Ground Moraine

.Wet, Grass-sedge Meadows

LTA Ia

Nearly level, wet, lowland areas on alluvial bottoms and in old lake basins. Streams are 3rd to 6th order and typically meander. Elevations range from 4,500 to 5,200 feet M.S.L. Precipitation ranges from 25 to 35 inches with about 40 percent coming as snow. This mapping unit has a water table at or near the surface for most of the year. Native hay was cut on this unit for winter feed as part of a ranching operation in the early 1900's. This mapping unit is the lowest in the landscape and accumulates cold air from the surrounding areas. Late spring and early summer frosts are common. Temperature inversions often trap smoke in the valleys, especially in the fall.

The vegetation is principally water-tolerant shrubs, such as bog birch and willow. Understory vegetation includes water tolerant sedges and rushes.

The soils are developed in a complex of parent materials ranging from alluvial silts, sands and gravels to lake-laid silty deposits with inclusions of thin organic deposits mainly in depressions and old beaver ponds. Soils are classified as Aquepts, Aquents, Aquolls, some with organic surface layers (Histic Integrades). The water table is at or near the surface most of the year.

This mapping unit is identified by a non-forest grass and shrub vegetation in broad basin bottoms adjacent to streams. Landforms are nearly level and low in topographic position.

This land type association is assigned to fire group 0 by Clayton. His description of the meadow component of this group is consistent with observations of this land type association.

Erosion hazards are low; however, because of the silty nature of stream banks within the land type association, erosion of stream banks due to increased streamflow following fire can be a major source of suspended sediment. Vegetative recovery following fire is rapid.

The Basin

LTA I : Forested Flood Plain
LTA Ib : Grass & Forested Stream Terraces
LTA III : Forested Glacial Ground Moraine

Grass & Forested Stream Terraces

LTA Ib

Nearly level to gently sloping, well drained glacial outwash and alluvial deposits on stream terraces and alluvial fans. Vegetation includes an association of coniferous forest with sagebrush and bunchgrasses. Elevation ranges from 4,800 to 5,200 feet M.S.L. Precipitation ranges from 20 to 30 inches with about 40 percent coming as snow. This mapping unit is low in the landscape and accumulates cold air from the surrounding areas. Late spring and early summer frosts are common. Temperature inversions often trap smoke in the valleys, especially the fall.

The vegetation is principally lodgepole pine in the forested areas. The grasslands are either sagebrush or bunchgrass, depending upon subsoil moisture-holding capacity. Soils with droughty subsoils support bunchgrass. Forest habitat types are ABLA/VACA or PICEA/VACA, depending upon elevation. FESC/FEID occurs on the droughty gravelly soils and ARTR/FESC on gravelly subirrigated alluvial fans. The distribution of vegetative types is clearly controlled by soil moisture-holding relationships.

Soils have developed in parent materials that include loamy outwash sand and gravels, coarse alluvium and inclusions of glacial scoured sandstones and shales.

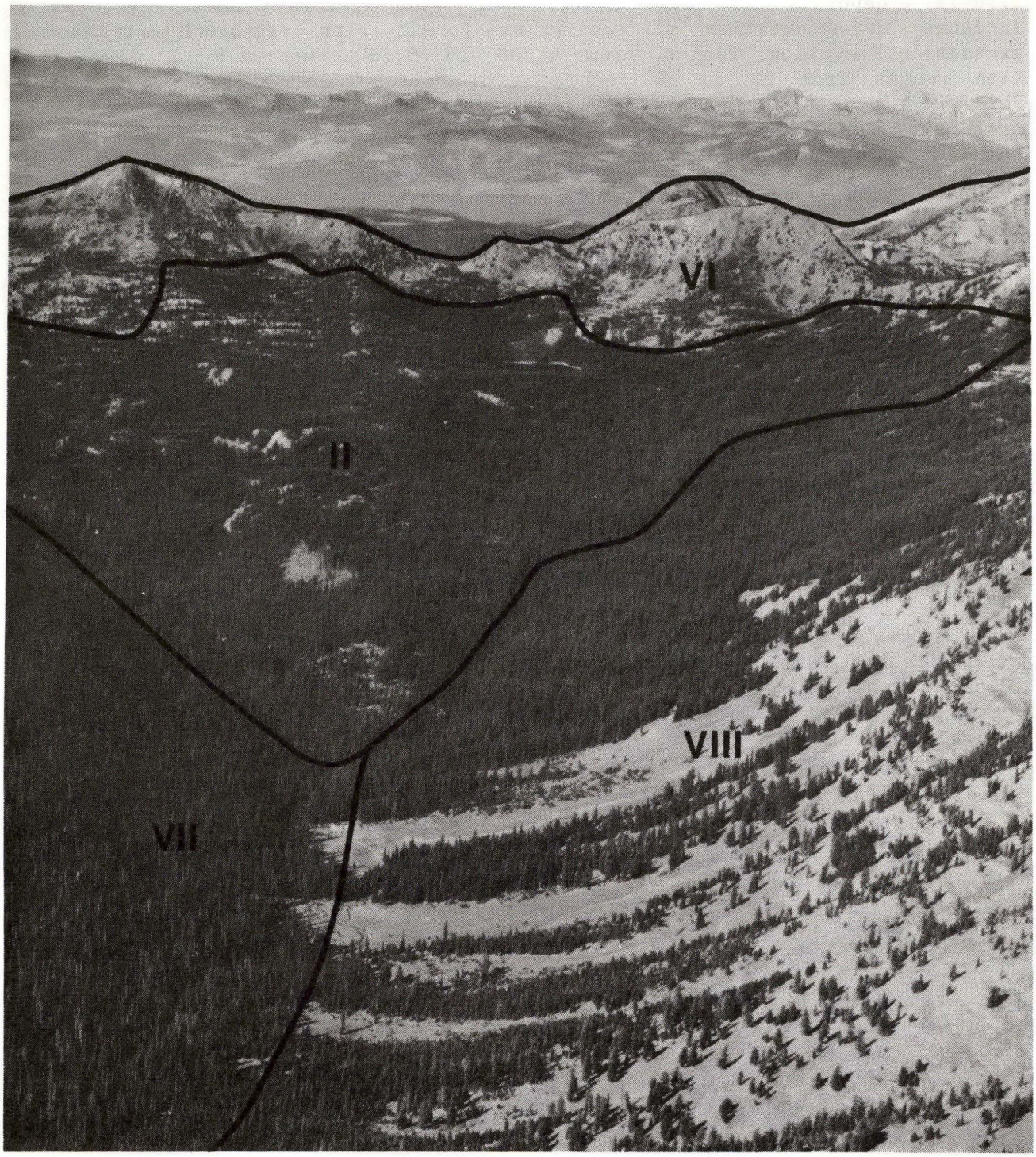
Soils in the forested areas are classified as Typic Cryoboralfs. Grassland areas are classified as Typic Cryoborolls and Argic Cryoborolls.

This mapping unit is identified by an association of forest and grasslands with low relief on stream terraces along major drainage ways.

This land type association is a complex of Clayton's fire groups 7 and 0,. occurring in a pattern too complex to map separately. His description of the grassy bald component of group 0 seems to fit the grassland component of this unit.

The erosion hazards are low and vegetative recovery following fire is rapid.

Pyramid Peak



LTA II : Glacial Cirque Basin
LTA VI : Peaks & Alpine Ridges - Sparsely Vegetated Rockland
LTA VII: Forested, Cool Aspect Breaklands
LTA VIII: Forested, Warm Aspect Breaklands

Glacial Cirque Basins

LTA II

Sloping to moderately steep glacial cirque basins formed by alpine glaciation on the lee side of major mountain ridges. Topography includes both concave basins and a step and threshold topography connecting a series of basins. Parent materials include an association of local glacial drift and glacially scoured bedrock. Elevation ranges from about 6,000 to 7,500 feet M.S.L. Precipitation ranges from 30 inches in the eastern part of the study area to more than 70 inches in the western part. Approximately 60 percent comes as snow. Snow comes early in the fall and does not melt until midsummer. The growing season is short. Early snow accumulation prevents these soils from freezing, hence snowmelt adds water to the soil profile yearlong.

Vegetation is principally subalpine fir, whitebark pine and spruce. Alpine larch occurs in isolated pockets. Habitat types include ABLA/LUHI-MEFE phase on the basin floors and cool aspects. ABLA-PIAL/VASC occurs on the residual soils, at slightly higher elevations and on western aspects. ABLA/MEFE occurs at slightly lower elevations in areas with good air drainage. ABLA/CACA occurs as grassy inclusions along small springs, seeps and heads of drains.

The soils are developed in loamy local glacial tills with a high percentage of subrounded stones and have a volcanic ash-rich (loess) brown surface 6 to 10 inches thick. They are classified as Andic Cryochrepts in the eastern part of the study area, where the volcanic ash surface layer is thin and as Andic Cryorthods in the west where the ash rich surface layer is thicker. The residual soils that occur on the glacial scoured areas are classified as Andic Cryochrepts and Typic Cryandepts. The short snow-free period (growing season), and low temperatures are limiting factors responsible for delayed forest regeneration and slow growth rates.

The qualities that differentiate this mapping unit are a circular-shaped basin with low relief below a very steep headwall. This unit occurs at high elevations and mainly on the north and east side of major mountain ridges.

This land type association is assigned to fire group 10. This land type association is capable of supporting continuous forest cover in which stands replacing fire at long intervals are most likely. Some inclusion of fire behavior group 9 occurs at the lowest elevations. Erosion hazards are low and vegetative recovery following fire is slow.

Upper Danaher Basin

LTA Ia: Wet, Grass-Sedge Meadows
LTA Ib: Grass & Forested Stream Terraces
LTA III: Forested Glacial Ground Moraine

Forested Ground Moraine

LTA III

Rolling to hilly valley floors containing glacial drift deposits and glacially scoured low relief bedrock hills. Elevation ranges from 4,600 to 5,600 feet. Precipitation varies from 20 inches in the eastern portion of the study area to 55 inches in the western portion. Approximately 50 percent falls as snow. These lower elevation lands contain many frost pockets where cold air accumulates. Late spring and early summer frosts are common. Temperature inversions often trap smoke in these valleys, especially in the fall.

Vegetation is principally lodgepole pine forest with aspen occurring on the moister microsites and Douglas fir on the drier. The lodgepole pine forest regenerates rapidly after fire, frequently to "dog hair" stands.

Dominant habitat types are PICEA/VACA and ABLA/VACA, their distribution apparently determined by temperature and soil moisture relationships. Cool moist concave depressions are typically ABLA/LIBO or PICEA/SMST and dry warm south facing slopes are PSME/CARU-AGSP or closely related habitat types. Composition is 70 to 80 percent PICEA, or ABLA/VACA; 10 to 15 percent PSME/CARU and 10 to 15 percent ABLA/LIBO or PICEA/SMST.

The soils are developed in parent material ranging from silty old lake deposits to gravelly and sandy glacial outwash, but are most commonly loamy glacial drift or residuum. Volcanic ash deposits are typically 6 inches thick in the western portion of the area, but become thin and inconsistent in the eastern portion. The soils typically have loamy topsoils underlain by clayey subsoils with moderately slow permeability, and are from 40 inches to over 60 inches deep.

Typic and Andic Cryoboralfs in loamy and clayey skeletal families dominate this unit.

These soils have excellent qualities as a plant growth medium but rooting depth is limited by compact subsoils, or droughty gravels in places.

The qualities that differentiate this unit from others are the low relief landforms at lower elevations supporting dense forest cover.

This land type association is assigned to fire group 7. It contains some inclusion of group 5 on south aspects.

Erosion rates are low and vegetative recovery following fire is rapid.

Dearborn River

LTA I : Forested Flood Plains
LTA IIIa : Forested Steep Lateral Moraine
LTA Va : Forested High Elevation Ridges

Forested Steep Lateral Moraine

LTA IIIa

Steep, forested, lower valley side slopes with average slopes between 25 and 60 percent. Thick deposits of clayey, slowly permeable glacial drift with a dense pattern of parallel low-order drainages. Drainage spacing is high 100's of feet with local relief of low 10's of feet. Elevation ranges from 5,500 to 6,800 feet. Precipation is 20 to 25 inches with approximately 50 percent falling as snow. The unit has good air drainage.

Vegetation is principally lodgepole pine forest with spruce and subalpine fir common in old-growth stands. The Lodgepole pine forest regenerates rapidly after fire. Dominant habitat types are ABLA/XETE on south or west aspects and ABLA/MEFE on north or east aspects.

The soils developed in a 4 to 10-inch thick layers of silty, wind-deposited volcanic ash overlying clayey slowly permeable glacial drift. They typically have loamy topsoils over clayey subsoils. They are more than 60 inches deep.

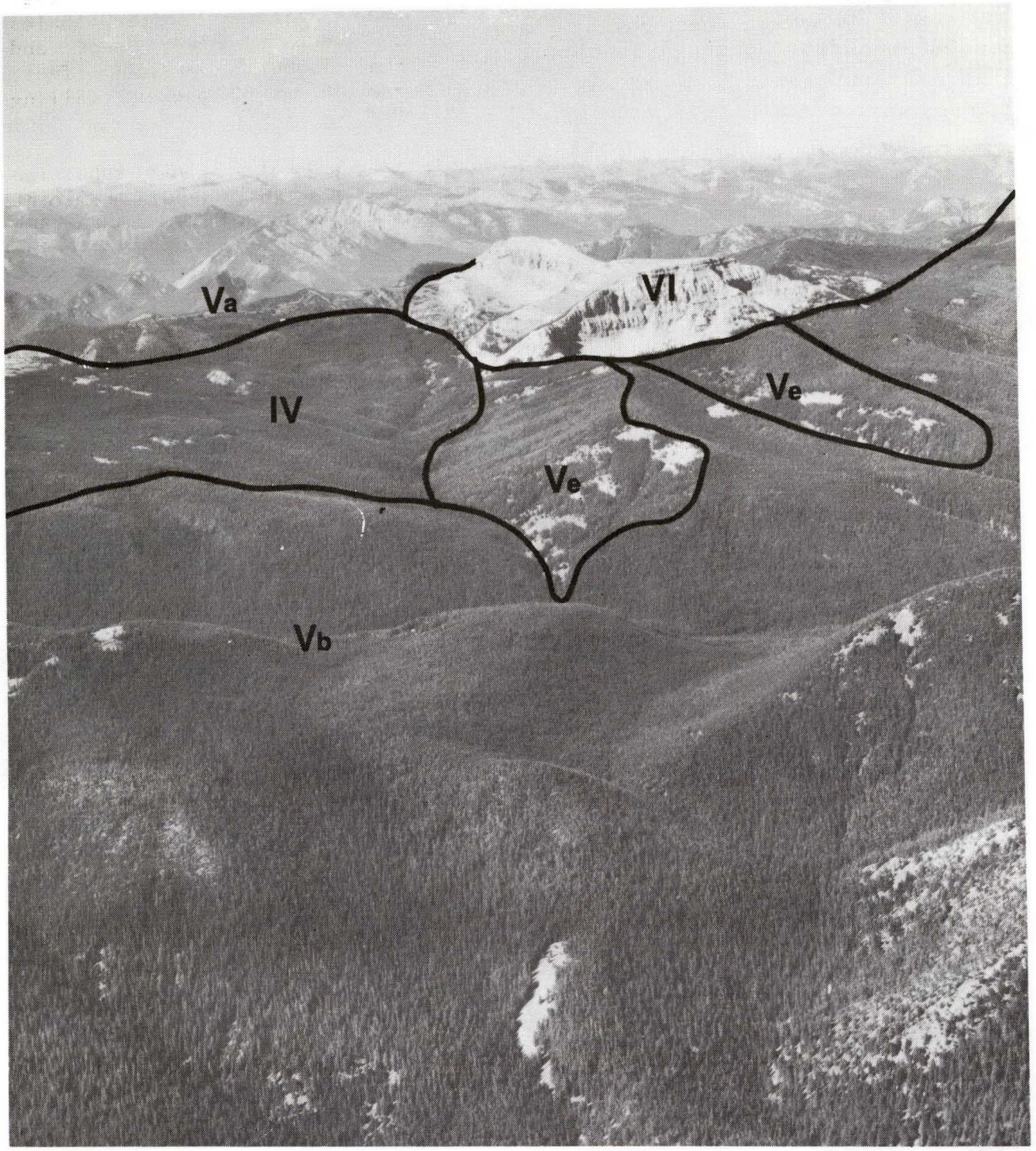
Andic Cryochrepts in a clayey skeletal family dominate this unit. The clayey subsoils limit plant root development and permeability. Perched water tables commonly develop above the clayey subsoils during snowmelt.

The quality that differentiates this unit from others is the deposition of slowly permeable glacial drift on steep slopes as indicated by a dense pattern of parallel low-order drainages.

This land type association is assigned to fire group 9, although it is actually a complex of groups 7 and 9. Because of the lower slope position occupied by this association, the ABLA/MEFE habitat is dominant on all aspects.

Water erosion hazards are low, but the unit is susceptible to rotational slumping when the timber cover is killed by fire or when an eroding stream bank undercuts the toe of the slope. Vegetative recovery following fire is moderate.

Sugarloaf Mtn.



LTA IV : Slump Land

LTA Va: Forested High Elevation Ridges

LTA Vb: Forested Smooth Residual Slopes

LTA Ve: Forested & Grassland Smooth Residual Slopes

LTA VI : Peaks & Alpine Ridges - Sparsely Vegetated Rockland

Slump Land

LTA IV

Moderately steep to steep hummocky or benchy slopes formed by slumping. These slopes frequently occur where limestone overlies softer shales or may occur where soft shales outcrop on steep slopes. Seeps and springs are common. Elevation ranges from 5,000 to 7,500 feet. Precipitation varies from 20 to 60 inches with 40 to 60 percent falling as snow. The unit has good air drainage.

Vegetation is mixed lodgepole pine, Douglas fir, spruce, and subalpine fir forest. Lower elevation units contain patches of aspen. Dominant habitat types above 5,600 feet are ABLA/XETE and ABLA/MEFE. ABLA/VACA and ABLA/LIBO dominate below 5,600 feet. Forest regeneration following fire is rapid.

The soils develop in clay loam or clay slump material frequently containing large glide blocks of limestone. They are typically deep with loamy topsoils and clayey subsoils. Typic and Andic Cryoboralfs in clayey skeletal families dominate this unit.

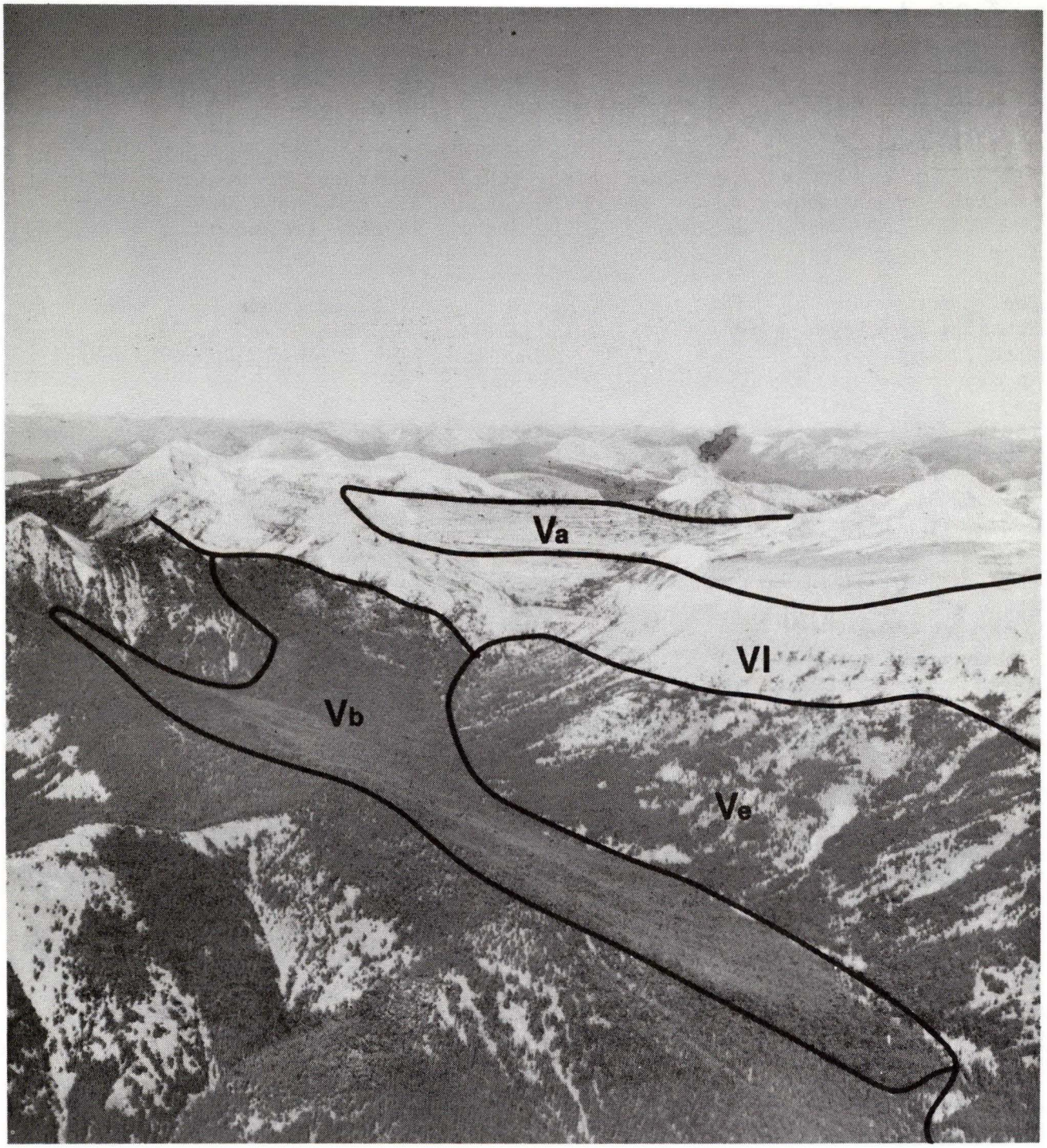
These soils are an excellent medium for plant growth, but the clayey subsoil may restrict root development in some areas.

The quality that differentiates this unit from others is the hummocky, benchy slopes formed by slumping.

This land type association is assigned to fire group 9, although it is actually a complex of groups 7 and 9. Stand structure and successional stages observed in the study unit are best represented by group 9.

Water erosion hazards are low. Fire may reactiviate movement of these slumps by increasing water stored in the soil mantle and by removing the stabilizing effect of tree roots. Vegetative recovery following fire is moderate.

Scapegoat Mtn.



LTA Va : Forested High Elevation Ridges
LTA Vb: Forested Smooth Residual Slopes
LTA Ve : Forested & Grassland Smooth Residual Slopes
LTA VI : Peaks & Alpine Ridges - Sparsely Vegetated Rockland

Forested High Elevation Ridges

LTA Va

Rounded, convex-shaped ridgetops and upper valley side slopes. Slopes range from 25 to 50 percent. This mapping unit occurs mainly in the eastern half of the planning unit on softer nonbelt bedrocks. Elevation ranges from 6,800 to 8,000 feet. Small inclusions of alpine grassland occur above 8,500 feet in the Scapegoat Mountain area. Precipitation ranges from 25 inches in the eastern part to 50 inches in the midpart of the study area. Approximately 70 percent falls as snow. Temperature inversions may extend the fall growing seasons on ridgetops at the lower end of the elevation range.

Vegetation is principally mixed whitebark pine and lodgepole pine at the lower elevation grading into open growing, wind-deformed forest of whitebark pine, spruce, subalpine fir, and alpine larch at higher elevations. On included small areas of alpine ridges, the vegetation is a forb-rich grassland.

Principal habitat types are ABLA-PIAL/VASC, ABLA/LUHI and ABLA/XETE-VASC phase at lower elevations grading to PIAL/ABLA, and LALY/PIAL at higher elevations. The highest alpine ridges are Deca/feid.

The soils develop in parent material consisting of thin layers of volcanic ash deposits, 4 to 12 inches thick, overlying stony, loamy material weathered from the underlying rock. The soils typically have silty topsoils underlain by stony loamy subsoils. They average 20 to 60 inches deep.

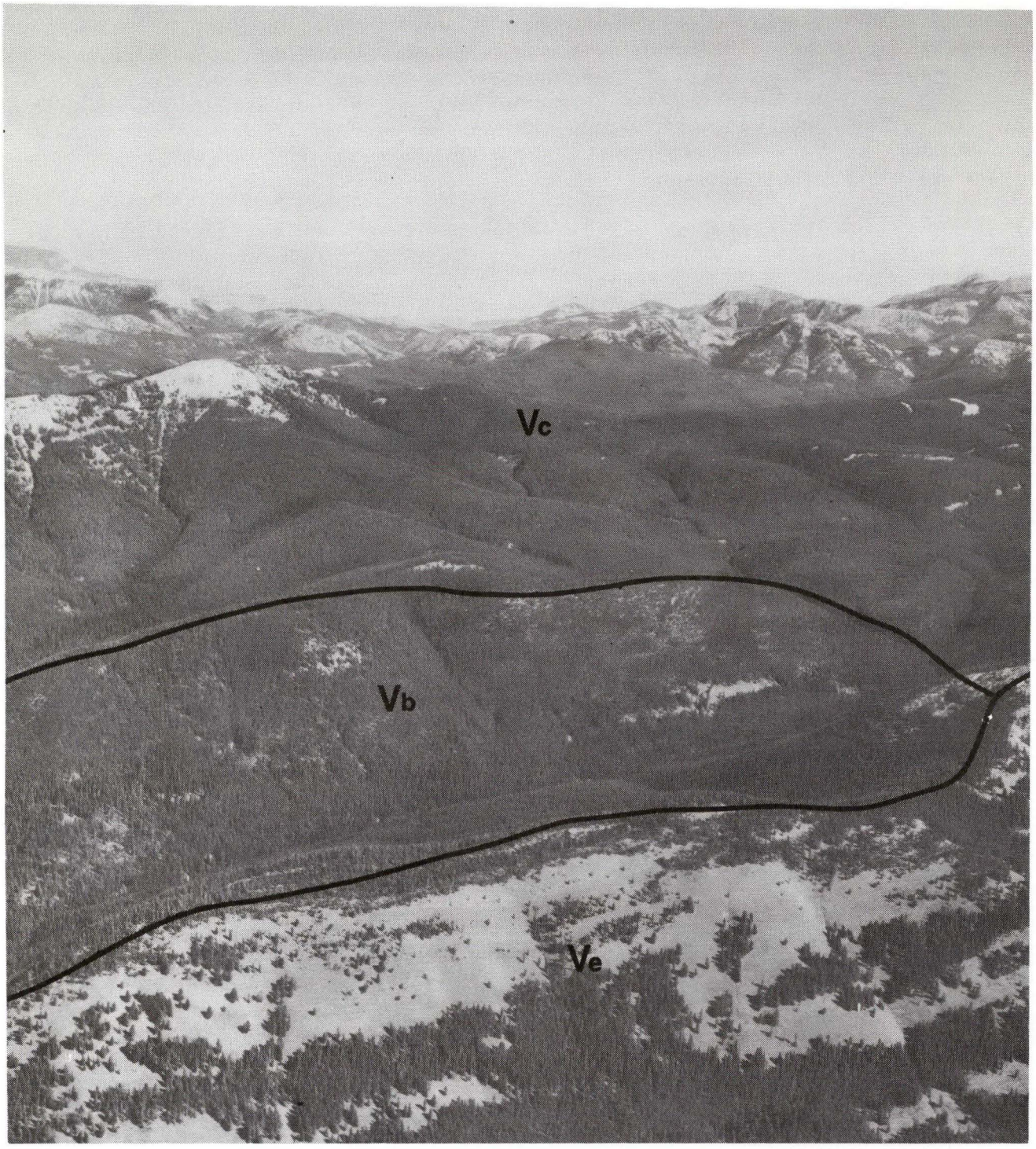
Andic Cryochrepts in a loamy-skeletal family dominate the mapping unit. These soils are highly permeable and an excellent medium for plant growth. The severe subalpine climate limits plant growth.

The qualities that differentiate this unit from others are slopes less than 60 percent above 6,800 feet elevation.

This land type association is assigned to fire group 10 The land type association contains almost all conditions described for this fire behavior group.

Erosion hazards are low and vegetative recovery following fire is slow. Stand destroying fire produce greater water yield increase for longer periods of time on this land type association than on any other found in the study area.

Rapid Creek



LTA Vb: Forested Smooth Residual Slopes
LTA Vc: Forested Moderately Dissected Residual Slopes
LTA Ve: Forested & Grassland Smooth Residual Slopes

Forested Smooth Residual Slopes

LTA Vb

Steep, forested mountain slopes with average slopes between 25 and 60 percent. Low-order stream spacing is low thousands of feet with local relief between drainages and ridges of high 10's of feet. More than 50 percent of the landform is spur ridgetop with the remainder in low-order stream valley side slope. Elevation ranges from 5,000 to 6,800 feet. Precipitation ranges from 20 to 60 inches with the highest precipitation in the western portion of the study area. Approximately 60 percent falls as snow. This mapping unit has good air drainage.

Vegetation is principally lodgepole pine with western larch commonly associated at lower elevation in the western portion of the study area.

Dominant habitat types are ABLA/XETE-VAGL phase on south and west aspects and ABLA/MEFE on north and east aspects. Included habitat types are PSME/SYAL and PSME/CARU below 5,600 feet on south aspects, ABLA/VAGL below 5,600 feet on east and west aspects and ABLA/LIBO below 5,000 on north aspects.

The soils are developed in parent materials consisting of a thin layer of volcanic ash, 4 to 12 inches thick, overlying stony loamy material weathered from the underlying becrock. The soils typically have silty topsoils overlying stony loamy subsoils. The average from 40 to 60 inches deep. Andic Cryochrepts in a loamy skeletal family dominate this unit. These soils have excellent qualities as a plant growth medium.

The qualities that differentiate this unit from others are a continous forest cover, slopes between 25 and 60 percent, and slight to moderate dissection by low-order drainages.

This land type association is a complex of fire groups 7 and 9, but should be treated as group 7 in the study area due to the dominance of lodgepole pine in the existing stand.

Erosion hazards are low and vegetative recovery following fire is moderate.

Sugarloaf Mtn.

LTA Vb: Forested Smooth Residual Slopes
LTA Vc: Forested Moderately Dissected Residual Slopes
LTA VI : Peaks & Alpine Ridges - Sparsely Vegetated Rockland

Forested Moderately Dissected Residual Slopes LTA Vc

Steep, forested mountain slopes with average slope between 25 and 60 percent. Low-order stream spacing is low thousands of feet with local relief between drainages and ridges of high 100's of feet. More than 50 percent of the unit is low-order drainage valley side slope. Elevation ranges from 5,000 to 6,800 feet. Precipitation ranges from 20 to 60 inches with the higher precipitation in the western portion of the study area. The unit has good air drainage.

Vegetation is principally lodgepole pine forest with western larch commonly associated at lower elevation west of the Continental Divide.

Dominant habitat types are ABLA/XETE-VAGL phase on south or west aspects and ABLA/MEFE on north or east aspects. Included are PSME/SYAL and PSME/CARU, DF/CARU below 5,600 feet on south aspects, ABLA/VAGL below 5,600 feet on east or west aspects and ABLA/LIBO below 5,000 feet on north aspects.

The soils have developed in parent material consisting of 4 to 12 inches of volcanic ash, rich wind deposited silt overlying stony, loamy material weathered from the underlying bedrock. The soils typically have silty topsoils overlying stony, loamy subsoils. They average betwen 40 and 60 inches deep.

Andic Cryochrepts in loamy skeletal families dominate this unit. The soils contain no restrictions to plant growth.

The qualities that differentiate this unit from others are slopes between 25 and 60 percent, supporting continuous dense forest cover, well dissected by low-order drainages.

This land type association is a complex of fire groups 7 and 9. It should be treated as fire behavior group 7 because of the prevalence of lodgepole pine dominated stands.

Erosion hazards are low and vegetative recovery following fire is moderate.

Scapegoat Mtn.

LTA Vd: Forested and Grassland Moderately Dissected Residual Slopes

LTA VI: Peaks & Alpine Ridges - Sparsely Vegetated Rockland

Forested & Grassland Smooth Residual Slopes LTA Vd

Steep, south or west facing mountain slopes supporting a mosaic of dense timber, open growing timber and parks. Average slope is between 25 and 60 percent. Low-order stream spacing is midthousands of feet and relief between drainage and ridge is high 10's of feet. More than 50 percent of the slope is spur ridge. Elevation ranges from 5,00 to 6,800 feet. Precipitation ranges from 20 to 60 inches with the higher amounts in the western portion of the study area. The unit has good air drainage.

Vegetation is 70 percent open growing stands of Douglas fir and small bunchgrass parks and 30 percent with dense lodgepole pine forests included on north or east facing slopes. Dominant habitat types in the open growing Douglas fir stands are PSME/CARU-AGSP phase and PSME/FEID. Small bunchgrass parks are FESC/AGSP or FESC/FEID. The included dense lodgepole pine forests are dominantly on ABLA/XETE-VAGL phase or ABLA/VAGL habitat types. Other dry habitat types in the Douglas fir series are included.

The soils have developed in loamy material weathered from the underlying bedrock. Thin surface layers of volcanic ash rich silt occur under lodgepole pine forest on north or east aspects. The soils have loamy topsoils and stony loamy subsoils. They range from 20 to 60 inches deep, with the shallow soils most common under grassland.

Typic and Lithic Cryoborolls occur under grassland and Douglas fir forest. Typic and Andic Cryochrepts occur under lodgepole pine forest.

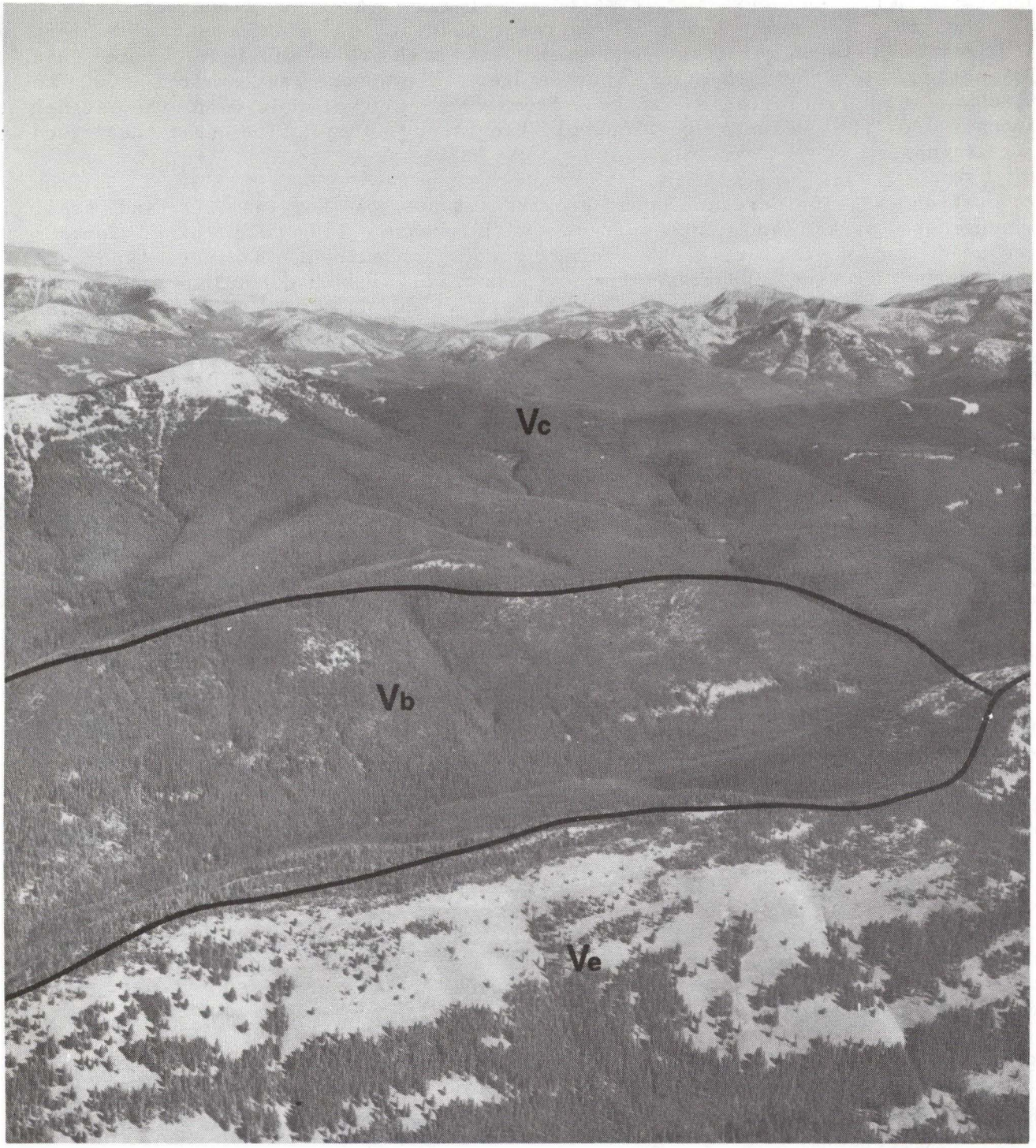
Potential plant growth is limited by shallow soils, low water holding capacity and high evapotranspiration rates on these warm aspects.

The qualities that differentiate this unit from others are slopes less than 60%, low local relief and mixed forest and grassland vegetation.

This land type association is a complex of fire groups 5 (50%), 0 (20%) and 7 (30%). The inclusion of group 6 occurs on included north or east facing slopes too small to map separately. The unit should be treated as all group 5. Ponderosa pine is rare on this land type association and the normal succession following a stand destroying fire is a long stage of grass and shrubs which Douglas fir slowly invades. It is hard to determine if many areas are natural grassland or unregenerated old burns. Some inclusion of group 0, grassy bald, occurs on these areas.

Erosion hazards are low and vegetative recovery following fire is slow on the major part of the association.

Rapid Creek



LTA Vb: Forested Smooth Residual Slopes
LTA Vc: Forested Moderately Dissected Residual Slopes
LTA Ve: Forested & Grassland Smooth Residual Slopes

Forested & Grassland Smooth Residual Slopes

LTA Ve

Steep, south or west facing mixed forest and grassland mountain slopes with average slopes between 25 and 60 percent. Low-order stream spacing is midthousands of feet and relief between drainage and ridge is high hundreds of feet. More than 50 percent of this unit is low-order drainage valley side slope. Elevation ranges from 5,000 to 6,800 feet. Precipitation ranges from 20 to 60 inches with the higher precipitation in the western portion of the study area. The unit has good air drainage.

Vegetation is mixed lodgepole pine forest (30%) and open growing Douglas fir forest (70%). The lodgepole pine component regenerates rapidly after fire but the Douglas fir is very slow to regenerate. Dominant habitat types supporting lodgepole pine are ABLA/XETE and ABLA/VAGL. PSME/CARU, PSME/FEID and FESC/FEID are found in the open areas. Other habitat types in the Douglas fir series with seral stages containing bunchgrass are included.

The soils develop in loamy material weathered from the underlying bedrock. Thin surface layers of silty volcanic ash are found under lodgepole pine. The soils have loamy topsoils and stony loamy subsoils. They range from 20 to 60 inches deep, with the shallow soils occurring under grassland.

Typic and Andic Cryochrepts in loamy-skeletal families occur under lodgepole pine forest. Typic and Lithic Cryoborolls occur under the Douglas fir forest and grassland parks.

Plant productivity is limited by shallow soils, low water-holding capacity and high evapotranspiration rate on these warm aspects.

The qualities that differentiate this unit from others are slopes less than 60 percent, high local relief and mixed forest and grass vegetation.

This land type association is a complex of fire groups 5 (50%), 0 (20%), and 7 (30%). The inclusion of fire group 7 occurs on north or east aspects included on these generally south or west facing slopes. It should be treated as fire behavior group 5 because of its dominance. Ponderosa pine is very rare on this land type association and the normal succession following a stand destroying fire is a long stage of grass and shrub land during which Douglas fir slowly invades. It is hard to determine if many areas are natural grassland or unregenerated burns. Fire behavior group 0, grassy bald, occurs on these areas.

Erosion hazards are low and vegetative recovery following fire is slow on the major part of the land type association.

South Fork of Sun River

LTA VI : Peaks & Alpine Ridges - Sparsely Vegetated Rockland
LTA Vb: Forested Smooth Residual Slopes

Peaks & Alpine Ridges - Sparsely Vegetated Rockland

LTA VI

Steep to very steep peaks, glacial cirque headwalls, glacial valley trough walls and fault escarpments with slopes generally in excess of 60 percent and often nearly vertical. Nearly barren exposures of bedrock and talus with scattered islands of vegetation. Elevation ranges from 6,000 to 10,000 feet. Precipitation ranges from 30 to more than 80 inches in the western portion of the study area. Approximately 60 to 80 percent falls as snow.

More than 70 percent of the unit is barren rockland and talus with the remaining 30 percent supporting stunted, open growing stands of ABLA, PICEA, LALY and PIAL on scree. These highest ridges are susceptible to lightning strikes, but the discontinuous fuels limit the size of fires.

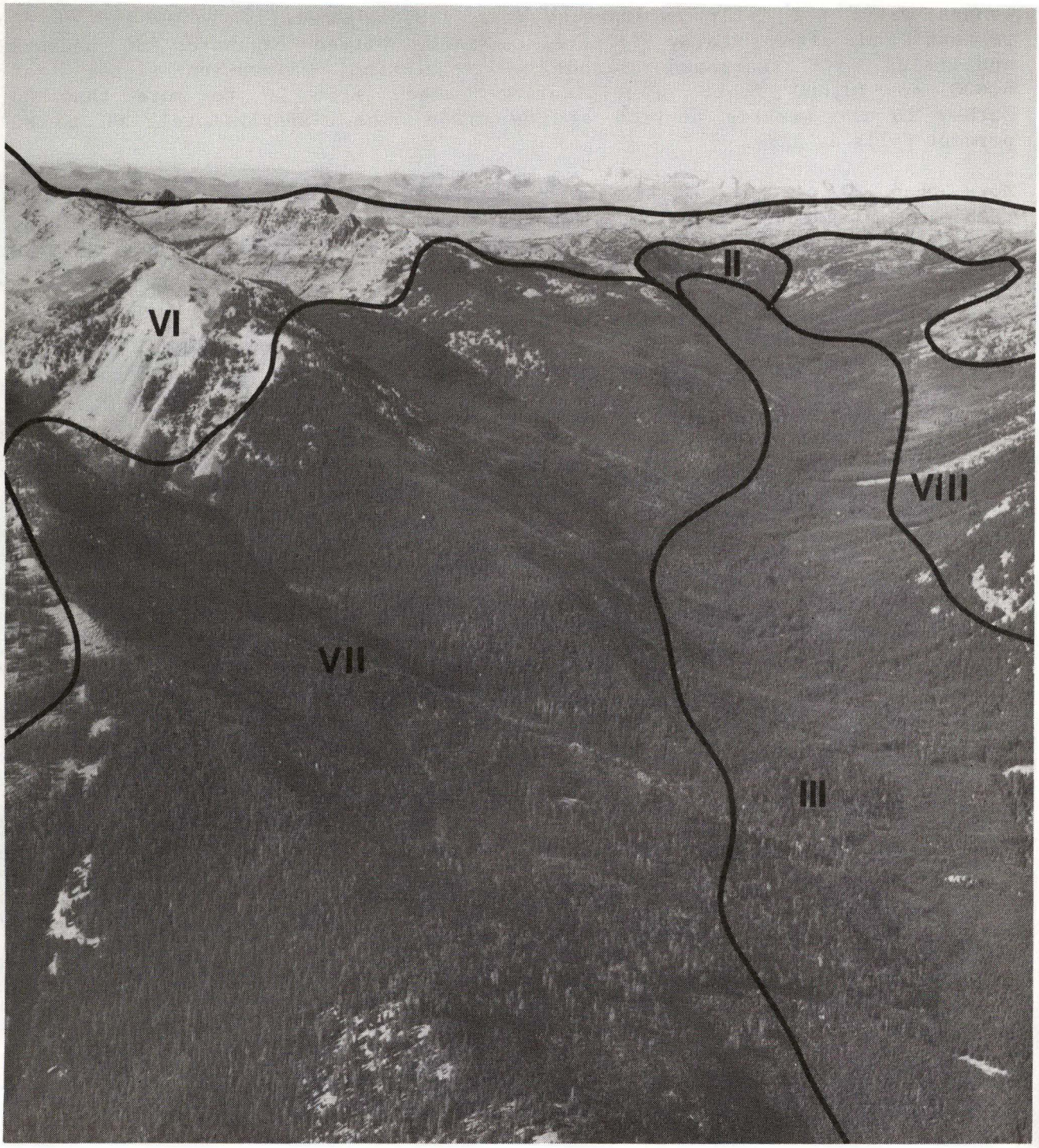
Less than 30 percent of the unit has a soil mantle. The soils develop in very stony colluvial deposits and are deep and loamy. They are very susceptible to dry soil creep.

This unit is differentiated from others by the large amounts of rock outcrop and talus which are barren of vegetation.

This Land Type Association is in fire group 10+0.

Due to the lack of vegetation, the unit is not susceptible to wildfire.

Youngs Creek



LTA III : Forested Ground Moraine
LTA VI : Peaks & Alpine Ridges - Sparsely Vegetated Rockland
LTA VII : Forested, Cool Aspect Breaklands
LTA VIII: Forested, Warm Aspect Breaklands
LTA II : Glacial Cirque Basins

Very steep, north facing, forested glacial valley trough walls with slopes of 60 to 80 percent. Glacial valley trough walls have shallow residual soils on the upper slopes and glacial drift plastered on the lower third of the slope. Avalanche chutes are common. Elevation ranges from 5,500 to 7,000 feet. Precipitation ranges from 25 to 60 inches with the higher amounts in the western portion of the study area. The unit has good air drainage.

Vegetation is lodgepole pine or mixed spruce and subalpine lpine fir forest in old growth stands. The forest regenerates rapidly after fire. Dominant habitat types are ABLA/MEFE with alder communities included in avalanche chutes.

The soils develop in loamy material weathered from the underlying rock on the upper slopes and firm loamy glacial drift and colluvium on the lower slopes. A 4- to 10-inch layer of silty volcanic ash mantles the entire slope. The soils have silty topsoils and stony loamy subsoils. They range from 20 inches deep on the upper slope to over 40 inches deep on the lower.

Andic Cryochrepts and Lithic Cryandepts in loamy skeletal, families dominate the mapping unit. The soils contain no limitations to plant growth, but the cold, moist climate and short growing season do. The soils have low water erosions hazards but the drift on the lower slope is susceptible to slumping when undercut by stream bank erosion.

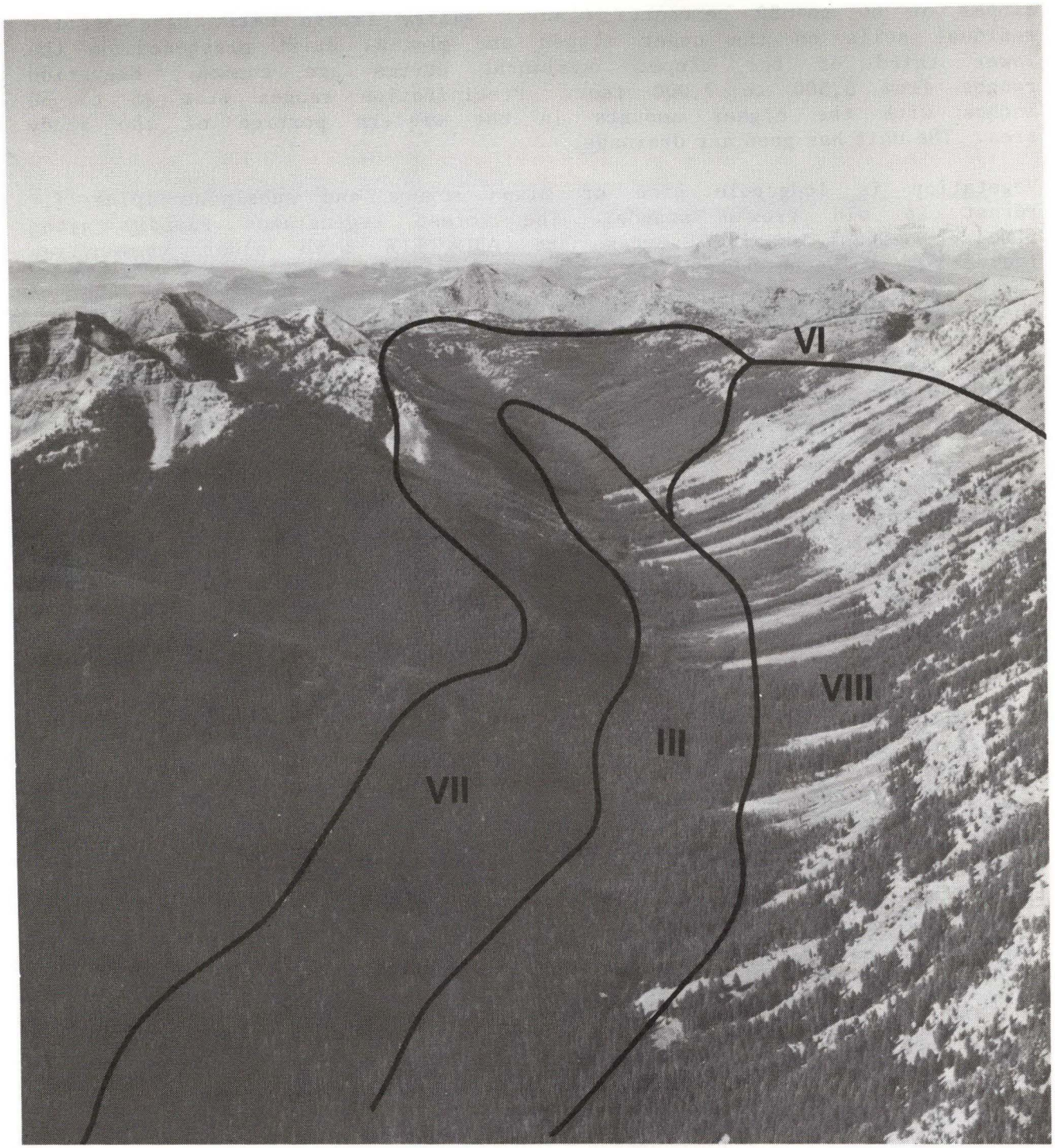
The qualities that differentiate this unit from others are slopes in excess of 60 percent with dense forest cover.

This land type association is assigned to fire group 9.

Vegetative recovery following fire is moderate.

The lower portion of these slopes have a mass failure hazard, and stand destroying fires may trigger mass movement by removing the stabilizing effect of tree roots and increasing the water held within the soil mantle.

Marshall Creek



LTA III : Forested Ground Moraine
LTA VII: Forested, Cool Aspect Breaklands
LTA VIII: Forested, Warm Aspect Breaklands
LTA VI : Peaks & Alpine Ridges - Sparsely Vegetated Rockland

Forested, Warm Aspect Breaklands

LTA VIII

Very steep south or west facing slopes containing 10 to 50 percent rock outcrop. Average slope is between 55 and 70 percent. Elevation ranges from 5,500 to 7,500 feet. Precipitation ranges from 20 to 60 inches with the higher amounts in the west part of the study area. Approximately 50 percent falls as snow. This mapping unit has good air drainage.

Vegetation is mixed open growing forest (60%), bunchgrass parks (20%), and dense lodgepole pine forest (20%).

Dominant habitat types supporting lodgepole pine are ABLA/XETE and ABLA/VAGL. The open growing forest component is PSME/FEID, PSME/CARU or PSME/SYAL-AGSP phase at lower elevation and ABLA/CAGE at higher. Bunchgrass parks are FESC/FEID. Other elevation habitat types in the Douglas fir series with seral stages containing bunchgrass are included. Up to 50 percent of this unit may be forested scree and rock outcrop.

The soils develop in very gravelly or stony colluvium. They are typically deep, loamy soils. Limestone is a common parent material and the soils are often calcareous.

Typic Cryochrepts and Typic Ustochrepts dominate this unit. When underlain by permeable limestones, these soils have droughty subsoils and late summer moisture stress limits plant growth. They have low water erosion hazards but are highly susceptible to dry soil creep.

The qualities that differentiate this unit from others are slopes greater than 60 percent supporting mixed dense forest, open forest and grassland.

This land type association is a complex of fire groups 5, 0, and 7. It is dominated by scree and forested rock in group 0 with islands of stable soils supporting forest in group 5 when the aspect is south or west and group 7 when the aspect is north or east. Because of the discontinuity of fuels, the unit should be treated as group 0.

Vegetative recovery following fire is slow because of dry sites and unstable soils.

The association has a moderate dry creep erosion hazard.

HABITAT TYPES AND PHASES 1/

Abbreviation Names	Scientific Names	Common Names
	PSEUDOTSUGA MENZIESII CLIMAX SERIES	
PSME/FEID	Pseudotsuga menziesii/Festuca idahoensis h.t.	Douglas-fir/Idaho fescue
PSME/FESC	Pseudotsuga menziesii/Festuca scabrella h.t.	Douglas-fir/rough fescue
PSME/VACA	Pseudotsuga menziesii/Vaccinium caespitosum h.t.	Douglas-fir/dwarf huckleberry
PSME/SYAL	Pseudotsuga menziesii/Symphoricarpos albus h.t.	Douglas-fir/snowberry phase
PSME/CARU-AGSP	Pseudotsuga menziesii/Calamagrostis rubescens h.t. - Agropyron spicatum phase	Douglas-fir/pinegrass-bluebunch wheatgrass phase
PSME/AGSP	Pseudotsuga menziesii/Agropyron spicatum	Douglas-fir/bluebunch-wheatgrass
	ABIES LASIOCARPA CLIMAX SERIES	
ABLA/GATR	Abies lasiocarpa/Galium triflorum	Subalpine fir/sweetscented bedstraw
ABLA/VACA	Abies lasiocarpa/Vaccinium caepitosum	Subalpine fir/dwarf huckleberry
ABLA/CACA	Abies lasiocarpa/Calamagrostis canadesis	Subalpine fir/bluejoint
ABLA/LIBO	Abies lasiocarpa/Linnaea borealis	Subalpine fir/twinflower
ABLA/XETE-VAGL	Abies lasiocarpa/Xerophyllum tenax h.t. - Vaccinium globulare (phase)	Subalpine fir/beargrass h.t. - Blue huckleberry (phase)
ABLA/XETE-VASC	Abies lasiocarpa/Xerophyllum texax h.t. - Vaccinium scoparium (phase)	Subalpine fir/beargrass h.t. - Grouse whortleberry (phase)
ABLA/VAGL	Abies lasiocarpa/Vaccinium globulare	Subalpine fir/blue huckleberry
ABLA/CAGE	ABies lasiocarpa/Carex geyeri	Subalpine fir/elk sedge
	PICEA CLIMAX SERIES	
PICEA/EQAR	Picea/Equisetum arvense	Spruce/common horsetail
PICEA/VACA	Picea/Vaccinium casepitosum	Spruce/grouse whortleberry
PICEA/LIBO	Picea/Linnaea borealis	Spruce/twinflower
PICEA/SMST	Picea/Smilacina stellata	Spruce/starry Solomon's seal
	UPPER SUBALPINE H.T.S.	
ABLA-PIAL/VASC	Abies lasiocarpa-Pinus albicaulis/Vaccinium scoparium	Subalpine fir-whitebark pine/grouse whortleberry
ABLA/LUHI-VASC	Abies lasiocarpa/Luzula hitchcockii h.t. - Vaccinium scoparium (phase)	Subalpine fir/smooth woodrush h.t. - Grouse whortleberry (phase)
ABLA/LUHI-MEFE	Abies lasiocarpa/Luzula hitchcockii h.t. - Menziesia ferruginea (phase)	Subalpine fir/smooth woodrush h.t. - Menziesia (phase)
	TIMBERLINE H.T.S.	
PIAL-ABLA	Pinus-albicaulis-Abies lasiocarpa h.t.s.	Whitebark pine-subalpine fir
LALY-ABLA	Larix lyallii-Abies lasiocarpa h.t.s.	Alpine larch-subalpine fir
PIAL	Pinus albicaulis h.t.s.	White bark pine

1/ Pfister, Robert D., Kovalchik, Bernard L., Arno, Stephen F., and Presby, Richard C., Forest Habitat Types of Montana. USDA Forest Service, General Technical Report, INT-34, May 1977.

DANAHER-SCAPEGOAT

Land Type Association Characterization

LTA	Landform	Class	Elevation	Dominant Aspect	Dominant Habitat Types	Vegetative Fire Group [1]	Vegetative - Hydrologic Recovery Rate [2]	Fire Induced Erosion Hazards [3]
I	Forested Flood Plains	0-10%	4500-5500'	None	ABLA/LIBO,	9	Rapid	Low
Ia	Wet, Grass-sedge Meadows	0-10%	4500-5200'	None	Willow-Sedge-Rush	0	Rapid	Low
Ib	Grass & Forested Stream Terraces	0-10%	4800-5200'	None	ABLA/VACA, FESC/FEID	Complex 7+0	Rapid	Low
II	Glacial Cirque Basins	0-40%	6000-7500'	N & E	ABLA-PIAL/VASC, ABLA/LUHI	10	Slow	Severe b
III	Forested Ground Moraine	0-25%	4600-5600'	None	PICEA/VACA, ABLA/VACA	7	Rapid	Low
IIIa	Forested Steep Lateral Moraine	5-60%	5500-6800'	None	ABLA/MEFE, ABLA/XETE	9	Moderate	Moderate a
IV	Slump Land	0-40%	5000-7500'	None	ABLA/XETE, ABLA/MEFE	9	Moderate	Moderate a
Va	Forested High Elevation Ridges	0-40%	6800-8000'	None	ABLA-PIAL/VASC, ABLA/LUHI	10	Slow	Severe b
Vb	Forested Smooth Residual Slopes	25-60%	5000-6800'	N & E	ABLA/XETE, ABLA/MEFE	7 + 9	Moderate	Low
Vc	Forested Moderately Dissected Residual Slopes	25-60%	5000-6800'	N & E	ABLA/XETE, ABLA/MEFE	7 + 9	Moderate	Low
Vd	Forested & Grassland Moderately Dissected Residual Slopes	25-60%	5000-6800'	S & W	PSME/FEID, FESC/FEID	5	Slow	Low
Ve	Forested & Grassland Smooth Residual Slopes	25-60%	5000-6800'	S & W	PSME/FEID, FESC/FEID	5	Slow	Low
VI	Peaks & Alpine Ridges - Sparsely Vegetated Rock Land	60% +	6000-10000'	All	ABLA-PIAL/VASC + SCREE	10 + 0	Slow	Low
VII	Forested, Cool Aspect Break Lands	60% +	5500-7500'	N	ABLA/MEFE	9	Moderate	Moderate a
VIII	Forested, Warm Aspect Break Lands	60% +	5500-7500'	S & W	PSME/FEID, CARU PSME/SYAL + AF/XETE + SCREE	0	Slow	Low

1/ Reference Report: Fire Ecology of Lolo National Forest Habitat Types, Bruce D. Clayton and William C. Fischer. USDA - Forest Service General Technical Report, INT-79.

2/ Vegetative-hydrologic recovery: The rating is based on estimated rates of secondary succession for habitat types occurring within the land type association.

Recovery is assumed to be a 10% or less increase in water yield compared to mature forest cover. The rating considers factors such as evapotranspiration rates, interception losses and redistribution of snow in forest openings. Rating definitions: Rapid--less than 40 years. Moderate--40 to 60 years. Slow--60 or more years. Reference page 10, section 2C, Forest Hydrology, USDA - Forest Service, Part 2.

3/ Fire caused accelerated erosion hazard: This is a rating of the probability of fire induced accelerated erosion. Rating considers water, dry creep, and mass movement erosion. The ratings are defined as follows: Low--either there is no hazard or the probability is so low that it need not be considered in planning. Generally any accelerated erosion which occurs following fire will not have a measurable effect on water quality. Moderate--accelerated erosion may increase sediment load of streams but not sufficiently to affect downstream fisheries or recreation uses. Some degradation of the esthetic quality of streams occurs and if reservoirs occur downstream, accelerated sediment deposition is an added cost. High--accelerated erosion following fire produces dramatic increases in sediment loads of streams with high probability of adverse effects on fisheries and recreation uses. Sedimentation of reservoirs is an added cost.

The rating assumes a fire intense enough to kill overstory vegetation and consume litter and duff layers on most of the burned area. Fires of less intensity can and do occur but will not appreciably affect erosion rates.

Erosive processes considered in making ratings were:

(a) Slumps and debris avalanches;

(b) Streambank erosion caused by increased water yield.

THE FIRE GROUPS

The forest habitat types of Montana (Pfister et al., 1977) have been assembled into 12 Fire Groups, which are defined as follows 1/:

Fire Group Zero: A heterogeneous collection of special habitats. on the Lolo National Forest these sites exist as scree, forested rock, meadow, grassy bald, and alder glade.

Fire Group One: Dry limber pine habitat types. These occur most often east of the Continental Divide in Montana. This group is not represented on the Lolo National Forest.

Fire Group Two: Warm, dry ponderosa pine habitat types. This group consists of open ponderosa pine stands with a predominantly grass undergrowth. These sites may exist as fire-maintained grasslands, and do not support Douglas fir except as "accidental" individuals.

Fire Group Three: Warm, moist ponderosa pine habitat types. These sites occur in eastern Montana. Fire Group Three is not represented on the Lolo.

Fire Group Four: Warm, dry Douglas fir habitat types. These are areas that exist in nature as fire-maintained ponderosa pine stands that develop Douglas fir regeneration beneath the pine in the absence of disturbance.

Fire Group Five: Cool, dry Douglas fir habitat types. Douglas fir is often the only conifer that occurs on these sites. In the absence of fire, dense Douglas fir sapling understories may develop.

Fire Group Six: Moist Douglas fir habitat types. Group Six habitat types will support substantial amounts of Douglas fir even when subjected to periodic fire.

Fire Group Seven: Cool habitat types usually dominated by lodgepole pine. This group includes stands in which fire maintains lodgepole pine as a dominant seral as well as those in which it is a persistent dominant species.

Fire Group Eight: Dry, lower subalpine habitat types. This is primarily an eastern Montana group, although it is represented on the Lolo.

Fire Group Nine: Moist, lower subalpine habitat types. Group Nine is a collection of lower subalpine habitats in which fires are infrequent but severe, with long-lasting effects.

Fire Group Ten: Cold, moist upper subalpine and timberline habitat types. Group Ten is a collection of high-elevation habitats in which fires are infrequent. Small area fires are common because of the fuel situation. Severe fires have long-term effects.

Fire Group Eleven: Warm, moist grand fir, western redcedar, and western hemlock habitat types. These are moist habitats in which fires are infrequent and often severe.

1/ Davis, Kathleen M., Clayton, Bruce D., and Fischer, William C., Fire Ecology of Lolo National Forest Habitat Types, 1980. USDA Forest Service Gen. Tech. Rep. INT-79, 77 pages. Intermountain Forest and Range Experimental Station, Ogden, Utah 84401.

Fire Induced Erosion Hazards

The purpose of this section is to document the assumptions made in assessing fire's influence on erosion rates in the study area and to record their basis in experience or research.

This section assumes a fire intensity sufficient to kill the overstory vegetation and expose bare mineral soil over most of the burned area. Fires which do not kill the overstory on most of the burned area have no appreciable effect on erosion rates in the study area because acceleration of the erosional processes operating is dependent upon removal of the overstory canopy. A fire of sufficient size to affect watershed behavior is also assumed since the rating is based on the effect of erosion on water quality. The minimum size of burn which will affect water quality is a function of location in the watershed and, therefore, no minimum size can be established. However, burns of 100 acres or larger will normally be required to have measurable impact.

The effects of the large stand destroying fires used in this rating are to:

(1) Kill the overstory and consume litter and duff layers, exposing bare mineral soil over much of the burn. Secondary effects of killing the overstory are to:

(a) Reduce evapotransporation rates and increase water yield until forest cover is re-established. In watersheds where stream channel stability is near an equilibrium threshold, the increased streamflow after fire can cause extensive stream bank erosion. The stream channels in the study area are commonly incised into thick unconsolidated deposits of glacial drift or colluvium. Flood events in 1964 and 1975 have caused extensive channel bank erosion. Based on these observations, it is assumed that fires which burn the higher elevation, high water yield land type associations can produce increases in water yield sufficient to cause bank erosion and dramatic increases in sediment loads during peak runoff periods. It is assumed that this is a major sediment source in the study area.

(b) To activate landslides and slumps on steep slopes with thick mantles of unconsolidated material. Tree roots tend to stabilize these slopes, and five to ten years after the forest is killed by fire and the roots begin to decay, an increased incidence of mass failure erosion is likely. Old burns on certain land type associations in the study area contain recent slumps and slides. Based on this observation, it is assumed that this effect is a major cause of increased sedimentation after wildfire in the study area.

(c) To increase dry soil creep on steep south or west facing slopes. The removal of shade on these slopes increases the daily temperature fluctuation, particularly in the spring. These wide daily temperature fluctuations loosen individual particles of rock and soil which roll downslope. In the study area, land type associations with this hazard rarely occur adjacent streams and this form of erosion is a very minor source of sediment.

(2) The heat of the fire volitalizes organic compounds in the litter and duff which induce water repellancy in the mineral soil surface. The water repellant layer will generally be less than an inch thick in the loamy soils common to the study area and will disappear during the winter following the fire, consequently the burned area soils will have near normal permeability during spring snowmelt and early summer thunder storms. Overland flow and water erosion of the soil following fire will, therefore, be rare and a minor source of sediment in the area. These assumptions are based on observations of fire outside the study area and the article: "Water Repellant Soils - A Worldwide Concern in Management of Soil and Vegetation" by Leonard F. Devano.

(3) The combustion of organic matter releases its mineral component which becomes temporarily mobile. The soils of the study area have moderate to high cation exchange capacity and are assumed to be capable of absorbing and retaining in the ecosystem most of the plant nutrient mobilized by fire.

SELECTED OBSERVATIONS BY DANNY ON

ON STUDY AREA VEGETATION AND FIRE BEHAVIOR

(As Prepared by Herb Holdorf, Lewis and Clark National Forest)

Danny On participated in the gathering of field data for this inventory. His observations were recorded in a draft report on "Fire Behavior by Habitat Types" and in review comments to a draft copy of this legend.

Most of his general comments on Fire Behavior by Habitat Type were repeated in Clayton and Fischer's "Fire Ecology of Lolo National Forest Forest Habitat Types" INT-79. This section selects those comments which were specific to the study area and organizes them by Clayton and Fischer's Eastern Montana fire groups and the Land Type Associations used in this inventory.

The complete draft report on Fire Behavior by Habitat Types follows.

Fire Group 5 & 6: General Observations

During the field reconnaissance, the following habitat types of these groups were sampled or observed:

PSME/CAGE
PSME/CARU-CARU
PSME/CARU-AGSP
PSME/SYAL-CARU
PSME/FEID

On the driest sites, Douglas fir/Idaho Fescue is associated with closely related habitat types, ponderosa pine savannas, and bunchgrass types. Occasional lodgepole pine can be found in the savannas. In the Danaher and Basin Creek areas, immature ponderosa pine is apparently absent and there was very little invasion of any species in the grassland openings.

Specific Comments

LTA Vd: These open growing Douglas fir and grasslands have been burned frequently by low-intensity fires. Stand replacement burns occur at long intervals. The lodgepole stand inclusions will regenerate rapidly after fire, but growth may be slow.

Fire Group 7: General Observations

In the south portion of the Bob Marshall Wilderness Area, lodgepole pine was found to be the major or sole seral dominant species in the following habitat types:

PSME/CARU-ARUV
PSME/VAGL-VAGL
PICEA/VACA
PICEA/CLUN-VACA
PICEA/LIBO
ABLA/VACA
ABLA/XETE-VASC
ABLA/VASC-VASC

Pfister refers to lodgepole pine as the major or sole seral dominant on all of these habitat types except Douglas fir/pinegrass-kinnikinnick, which was identified at the ecotone of the subalpine fir/dwarf huckleberry habitat type. On the latter habitat type, lodgepole pine is described as "the sole dominant in nearly all stands sampled and it was often reproducing better than other conifers." This characteristic was typical in the study area; in many places there were inadequate subalpine fir to key into the subalpine fir series, and it does not seem likely that subalpine fir could ever dominate some of the sites. Among the habitat types listed as being present in the study area, the following are also likely to be dominated by lodgepole pine:

PSME/VAGL-XETE
ABLA/LIBO-VASC
ABCA/CACA-VAGA
ABLA/XETE-VAGL

Besides being characterized by lodgepole pine stands, these habitat types share similarities in undergrowth vegetation, which is largely composed of short shrubs with varying amounts of beargrass, pinegrass or elk sedge.

Climax or other shade-tolerant conifers are often sparse in the understory and unless mortality has added significant ground fuels, the highly inflammable crowns are isolated from fires in the undergrowth vegetation. Most of the lodgepole pine stands in the Danaher and Basin Creek areas fit this description. Ground fuels in those areas have not changed significantly for at least several decades.

Most of the stands observed in the study area were moderately stocked, and they show a very small amount of suppression mortality. In the study area and in the habitat types under discussion, the seed source is almost always adequate. Low intensity fires will prepare sites for an understory of lodgepole pine, high intensity fires usually kill the overstory and prepare sites for even aged stands. Regeneration is likely to be prompt except in the few places where lodgepole pine is invading grasslands.

Presently the majority of lodgepole pine stands in the study area have light amounts of ground fuels and under most conditions fires would burn at low intensities. Some of the stands, however, are probably susceptible to mountain pine beetle attacks and the fuels could increase greatly in a few years. Lodgepole pine will dominate the tree seedling stands following fire. Growth to breast height will take about 10 years.

Specific Comments

LTA Ib: About 100 whitebark pine seedlings per acre occur on much of the forested portion of this LTA.

LTA Vb: Fire intensity and frequency vary by aspect and physiographic site. Estimated frequency of natural fires varies from 24 to 140 years. Reproduction of tree species may be slow, but undergrowth vegetation is likely to maintain good ground cover after low to moderate intensity wildfire.

Fire Group 9: Specific Comments

LTA I: The poorly drained and wetter sites have a low burn frequency and hence are often made up of uneven-aged stands. The well drained sites with a higher natural frequency of stand replacement burns are occupied mainly by even-aged stands of lodgepole pine. The spruce and subalpine fir/twinflower habitat types are likely to have shorter stand replacement burn intervals because they are drier sites. They also are susceptible to creeping low- to medium-intensity fire.

LTA VII: These habitat types regenerate slowly, but the undergrowth vegetation of these moist sites is not likely to be drastically affected by most burns. Fires are likely to be spotty and of low intensity.

Fire Group 10: General Observations

Stands in this group vary greatly in density and continuity due to rockland, avalanche paths, old burns and shrub fields. Although the discontinuity of forest cover may suggest the existence of some areas that have been exempt from past fires, Habeck and Mutch 1/ reported that searching has always yielded some charcoal in the subalpine fir/woodrush-menziesia habitat type located adjacent to this group; Bigler 2/ found charred wood in all stands, even in stands supporting 300-year-old spruce and estimated large fire periodicity at 250 to 400 years. Coniferous regeneration is extremely slow after fires. Revegetation of denuded areas by undergrowth plants is also slow, but such areas are likely to be small and scattered. The large infrequent stand replacement fires in this group generally start in adjacent drier sites.

Fire Group 0: General Observations (Grassy Bald Component)

More than 90 percent of big sagebrush plants can be killed by burning. The composition of herbaceous vegetation is not greatly altered by fire. Grass production commonly doubles after sagebrush removal, but the actual production on the sagebrush habitat type of the South Fork drainage is not expected to be significant because of soil limitations. Forb production also increases after sagebrush removal, but again, the actual production is not likely to be high. The conversion of a mountain sagebrush stand to herbaceous vegetation reduced seasonal moisture withdrawal about 15 percent. The effect of wildfire on sagebrush has been estimated to last 15 to 30 years.

FOOTNOTES

1/ Habeck, J.R. and Mutch, R.W., 1973, Fire-depndent Forests. Northern Rocky Mountains Quarternary Research, Vol. 3, No. 3, Academic Press.

2/ Bigler, R.L., Age and Size Class Distribution in the Abies Lasiocarpa/Luzula Hitchcockii-Menziesia Habitat Type in Northwestern Montana. University of Idaho Forest and Range Experimental Station (pending publication).

FIRE BEHAVIOR BY HABITAT TYPES AND THE RELATED EFFECTS

By Danny On

(Draft Report)

Introduction

On a given site, the behavior and effects of a fire are influenced by many factors. Quite appropriately, fuel loadings and weather have received much attention, but with an increasing concern about restoring wildfires to their natural role in wildlands, there is a need to recognize how they affected different ecosystems and how fire protection has influenced that role. There is also a need to predict on- and off-site effects in parts of the Bob Marshall Wilderness Area and the Lincoln Scapegoat Wilderness Area. They are being studied for a fire management plan which will permit wildfires to resume their natural role, subject to certain constraints. To provide data for the plan, a reconnaissance into the areas was made by soils scientists and the author in the summer of 1978. This report is based upon data gathered during that reconnaissance.

The scope of this report is quite limited to general features of habitat types. Additional information needed on fuel loadings, current vegetation, and the distribution of habitat types is being gathered by field crews.

Arno 1/ noted that most researchers are strongly tempted to generalize about fire behavior and added that perhaps fires in the Northern Rockies are not best described in broad generalizations. Hopefully, this report will not be viewed as such, but rather as an attempt to present data from different studies that can be related to habitat types, specific areas of land. The habitat types are aggregated into groups with similar vegetation and closely related environments. Habitat types that are almost always dominated by lodgepole pine are combined into one group because of similarities in characteristics relating to fire. Lodgepole pine is short-lived and very susceptible to beetle epidemics that result in sudden and great increases in fuel loadings. It was interesting to note that Davis, et al. 2/, working separately, also recognized a group based on lodgepole pine dominance. Their publication, "Fire Ecology of Lolo National Forest Habitat Types", covers in greater detail information on the relationship of major tree species to fire, forest fuels, the natural role of fire, fire and plant succession, and fire management considerations.

Ecoclass Groups 3/ 1, 2 and 3

The habitat types in these groups are warm to moderately cool and dry to moderately dry. Some of the stands and habitat types within these groups are dominated by lodgepole pine. The expected fire behavior and effects are described elsewhere in this text.

During the field reconnaissance, the following habitat types of these groups (excluding those dominated by lodgepole pine) were sampled or observed:

PSME/CAGE	PSME/SYAL-CARU
PSME/CARU-CARU	PSME/FEID
PSME/CARU-AGSP	

On the driest sites, Douglas fir/Idaho fescue is located with closely related habitat types, ponderosa pine savannas, and bunchgrass types. Occasional lodgepole pine can be found in the savannas. In the Danaher and Basin Creek areas, immature ponderosa pines are apparently absent and there was very little invasion of any species into the grassland openings. On the west side of Glacier National Park, Habeck and Mutch 4/ reported the invasion of grasslands by lodgepole pine and ponderosa pine openings by Douglas fir and spruce. The lack of ponderosa pine reproduction less than 50 years of age and hazardous fuel accumulations are regarded as a threat to the ponderosa pine community types. The differences between the two areas (Bob Marshall and Glacier Park) are worthy of further study.

These groups of habitat types include areas of the highest fire frequencies. On the Bitterroot National Forest, Arno 5/ found mean fire-free intervals of 6 to 19 years in comparable groups of habitat types. He included the Douglas fir/pinegrass-pinegrass habitat type with a moister group. Pinegrass cures later in the summer and remains relatively less flammable than the other habitat types in these groups.

The relatively short intervals between fires provided little time for heavy fuel accumulations, and fire intensities were usually not high. This fire regime favored the presence of ponderosa pine where it faces competition with more tolerant species. Undergrowth vegetation was affected very slightly by most burns. Stand replacement burns did occur however, and coniferous regeneration was often slow in establishment. Nonstocked old burns are a natural part of our forest environment. As a result of increased fuel loadings due to fire exclusion, wildfires are expected to be more intense in these groups of habitat types. (Fuel loadings in savannas and open ponderosa types of the study area have probably been affected only slightly by fire exclusion.) Relating to Arno's mean fire-free intervals (6 to 19 years), we have areas where 3 to 10 cycles have lapsed since the establishment of organized fire control. Fuel surveys associated with this study will quantify the fuel loadings and provide specific information for estimates of expected fire behavior.

Ecoclass Group 6

Group 6 is found on moist northerly slopes, stream bottoms, and moist benches. The habitat types in this group are as follows:

ABLA/CLUN	ABLA/LIBO
ABLA/CLUN-CLUN	ABLA/LIBO-LIBO
ABLA/CLUN-ARNU	ABLA/LIBO-XETE
ABLA/VACA	ABLA/MEFE
ABLA/CLUN-XETE	ABLA/ALSI
ABLA/CLUN-MEFE	ABLA/LUHI-MEFE
	TSME/MEFE

During the field reconnaissance, sampling was done only on the subalpine fir/ woodrush-menziesia habitat type of this group, but subalpine fir/sitka alder was seen in a mosaic with subalpine fir/grouse whortleberry-grouse whortleberry, subalpine fir/twinflower was seen along the South Fork of the Sun River, and subalpine fir/menziesia was recognized in several places.

The grouse whortleberry phase of the subalpine fir/twinflower is included in the coverage of habitat types dominated by lodgepole pine. The twinflower and beargrass phases are described by Pfiser, et al. 6/ as tending to have Douglas fir dominant over lodgepole pine; otherwise they could also be included. Douglas fir can provide a fuels ladder between ground and crown fuels. Compared with sites dominated by lodgepole pine, wildfires on those phases would be more likely to crown; otherwise fire behavior on these environments should be much like that of environments dominated by lodgepole pine. The majority of habitat types in this group have shrubby and sometimes luxuriant understories. Dominant components of timber stands usually consist of tolerant and intolerant species. Davis, et al. found the range of fuel loads in a comparable group, Fire Group 4, of habitat types to be similar to that of their cool, dry Douglas fir Fire Group 5. The important difference was that Group 4 stands have more large diameter downfalls. Fuel moisture is relatively high throughout the summer. Prior to the establishment of fire control, wildfires were usually small. Judging from the 374-year historical record on the Coram Experimental Forest, Sneck 7/ determined the sizes of known spreads to range from 15 to 475 acres and added that large fires (over 250 acres) were not characteristic, although they occasionally occur. Small and low intensity fires occur more frequently than stand replacement burns in this habitat type group but they occur at much longer intervals than in drier groups. During most summers, wildfires are likely to be of low intensity. Such fires will kill or damage thin-barked tree species and do relatively little damage to western larch and Douglas fir. Stand replacement burns can be expected when burning conditions are extreme or fuel loadings high. Regardless of fire intensity, undergrowth vegetation is likely to recover rapidly and coniferous regeneration is likely to be prompt.

In most cases, fires will increase browse production. Intense fires, however, will probably reduce huckleberry production for at least 10 years. 8/

Ecoclass Group 7

The Group 7 habitat types are wet environments ususally located in valley bottoms or lower slopes. The complete list is as follows:

PICEA/EQAR	ABLA/GATR
PICEA/GATR	ABLA/CACA
PICEA/SMST	ABLA/CACA-CACA
THPL/OPHO	ABLA/CACA-GATR
ABLA/OPHO	ABLA/CACA-VACA
	ABLA/ALSI

In the reconnaissance last summer, the only field plot sampled in this group was identified as being in the spruce/starry solomon's seal h.t. Holdorf listed subalpine fir/sweet-scented bedstraw, subalpine fir/common horsetail and subalpine fir/bluejoint as being in the landtype associations of the study area.

Certain generalizations can be inferred from the vegetation, which, compared with that on habitat types dominated by lodgepole pine, is much more likely to include old-growth stands dominated by tolerant species. The amount of heavy fuels is likely to be greater. Habeck 9/ reported these relationships in the Selway-Bitterroot Wilderness. The fuels inventory will quantify the relationships in the study area.

Along with others, Arno 10/ found evidence of greater fire frequencies on drier sites compared with wetter sites. Sneck 11/, in studying the fire history of the Coram Experimental Forest, found indications of more frequent and less intense fires on Douglas fir sites compared with moister hemlock sites.

Under most burning conditions, this group of habitat types is quite resilient to wildfires. Ground or surface fires on adjacent areas are unlikely to spread into these wet sites except as small spot fires. Using the methodology of Rothermel and Brown, Habeck found the old-aged streamside stands to have the lowest predicted fire spread rates. In narrow draws and under extreme conditons, these habitat types are susceptible to stand replacement burns. In broad valley bottoms the mosaic of water and wet meadows serves as a fuel break which protects portions of timber stands from burning. For several reasons, rapid vegetative recovery can be expected on these habitat types. The most important factor is moist to wet soils that protect underground parts of plants which sprout after fire. Abundant moisture also favors establishment of seedlings. Patches of vegetation are likely to escape the fire and serve as seed sources. Research by Lyon and Stickney 12/ showed that revegetation from surviving species accounted for 87, 71, and 84 percent of the composition of the first year community.

Habitat Types Persistently Dominated by Seral Lodgepole Pine

Although capable of growing on practically all but the coldest and driest Montana habitat types, lodgepole pine is consistently the dominant seral tree species in only a few. In these habitat types, lodgepole pine-dominated stands have been maintained for centuries by the natural occurrence of fires. The habitat types indicate a moderate temperature range and a fairly narrow moisture range. In the south portion of the Bob Marshall Wilderness Area, lodgepole pine was found to be the major or sole seral-dominant species in the following habitat types:

PSME/CARU-ARUV
PSME/VAGL-VAGL
PICEA/VACA
PICEA/CLUN-VACA
PICEA/LIBO
ABLA/VACA
ABLA/XETE-VACA
ABLA/VASC-VASC

Pfister refers to lodgepole pine as the major or sole seral-dominant on all of these habitat types except Douglas fir/pinegrass-kinnikinnick, which was identified at the ecotone of the subalpine fir/dwarf huckleberry habitat type. On the latter habitat type, lodgepole pine is described as "the sole dominant in nearly all stands sampled and it was often reproducing better than other conifers." This characteristic was typical in the study area; in many places there were inadequate subalpine fir to key into the subalpine fir series, and it does not seem likely that subalpine fir could ever dominate some of the sites. Among the habitat types listed as being present in the study area, the following are also likely to be dominated by lodgepole pine:

PSME/VAGL-XETE
ABLA/LIBO-VASC
ABLA/CACA-VACA
ABLA/XETE-VAGL

Besides being characterized by lodgepole pine stands, these habitat types share similarities in undergrowth vegetation, which is largely composed of short shrubs with varying amounts of beargrass, pinegrass or elk sedge. Climax or other shade-tolerant conifers are often sparse in the understory and unless mortality has added significant ground fuels, the highly inflammable crowns are isolated from fires in the undergrowth vegetation. Most of the lodgepole pine stands in the Danaher and Basin Creek areas fit this description. Ground fuels in those areas have not changed significantly for at least several decades.

Gabriel (1976) documented the occurrence of low-intensity fires at 20 to 40-year intervals at the southern half of his study area and found evidence of larger stand-destroying fires at the northern half. Arno (1976) reported the occurrence of ground fires so low in intensity that little of the overstory is killed and the stand is not opened enough to allow for establishing a new age class. The data could be misinterpreted. Low-intensity fires have burned in stands where the mountain pine beetle is setting the stage for stand-replacement burns.

Brown (1975) noted that fire can create more fuel in a shorter time than other mortality factors. Muraro (1971) describes some of the fire/fuel interactions related to three levels of fire intensity in lodgepole pine: (1) After a low-intensity fire, weakened trees die, become snags, then fall. Ground fuel quantities build up moderately. (2) After a moderate-intensity fire that has crowned, ground fuel will become abundant for an extended period. (3) After a high-intensity fire, deep burning over most of the area assures complete downfall in a short time. Ground fuel quantities are high after the fire but because intense burning eliminates the small branches, most of the fuel is of large size and lies close to the ground where it is less flammable and more rapidly decomposed.

After a fire of moderate intensity, the burned area would likely support dense regeneration; and with the heavy ground fuels, it would later be prone to high-intensity fire. If the fire occurred in a young stand, the limited seed would probably be destroyed and a very open stand or no stand would result. Most of the stands observed in the study area were moderately stocked and they show a very small amount of suppression mortality.

Muraro suggests that a natural process of fuel modification by fire intensity may discourage second fires of high intensity on severely burned areas and encourage high-intensity fires on areas that have been moderately burned.

Lyman 13/ estimates that the fire hazard in lodgepole pine peaks 25 years after a replacement burn. Thirty-five years after its peak, the hazard has declined 50 percent; in 60 years it has been reduced to a moderate level.

Leiberg 14/ believed that the large, high-intensity fires were due to the large quantities of dead material accumulated partly from past fires and partly from suppression mortality. The large area of heavy fuels on parts of the Bitterroot and Beaverhead Forests is the result of a mountain pine beetle epidemic. Suppression mortality is a major factor in the accumulation of ground fuels, and the timing of its occurrence is highly variable. Breakage from wind and snow is hard to predict. Predicting fuels and fire potential using combinations of stand density, average dbh, age, and habitat types is also risky.

According to Brown (1975) 15/, the accumulation of ground fuels and related fire intensity potential seems to follow two consistencies: (1) fuel quantities and fire potential become predictably high as stands reach over-maturity; and (2) fuel quantities and fire potential in young and immature stands cannot be predicted from age alone.

The effect of a fire on a given habitat type depends greatly on fire intensity, plant composition (stage of succession), and stand structure.

For the perpetration of lodgepole pine stands, the amount of serotinous cones is also important; this seed source may be absent from near-climax vegetation. In the study area and in the habitat types under discussion, the seed source is almost always adequate. Low-intensity fires will prepare sites for an understory of lodgepole pine; high-intensity fires usually kill the overstory and prepare sites for even-aged stands. Regeneration is likely to be prompt except in the few places where lodgepole pine is invading grasslands.

Presently the majority of lodgepole pine stands in the study area have light amounts of ground fuels, and under most conditions fires would burn at low intensities. Some of the stands, however, are probably susceptible to mountain pine beetle attacks and the fuels could increase greatly in a few years. Lodgepole pine will dominate the tree seedling stands following fire. Growth to breast height will take about 10 years.

Johnson 16/, in Wyoming, found that soil water depletion was reduced 11.1 cm in the year after the clearcutting of lodgepole pine on glacial till.

He referred to another study that revealed an average increase in water content of 13.3 cm. from small patch cuts in lodgepole pine in Colorado. The effects of fire on undergrowth vegetation vary with fire intensity, but from most standpoints they will be relatively minor in this group of habitat types. The more mesic plants like Twinflower will decrease, while grasses and annuals will increase. This group of habitat types has undergrowth communities of short shrubs, forbs and graminoids. Important browse species are generally absent.

Sagebrush 17/

More than 90 percent of big sagebrush plants can be killed by burning. The composition of herbaceous vegetation is not greatly altered by fire. Grass production commonly doubles after sagebrush removal, but the actual production on the sagebrush habitat type of the South Fork Drainage is not expected to be significant because of soil limitations. Forb production also increases after sagebrush removal, but again, the actual production is not likely to be high. The conversion of a mountain sagebrush stand to herbaceous vegetation reduced seasonal moisture withdrawal about 15 percent. The effect of wildfire on sagebrush has been estimated to last 15 to 30 years.

Ecoclass Group 8

This is a cold and moderately dry to moist group of habitat types found in the upper subalpine and timberline zone.

Habitat types in group 8 are listed below:

Because of dominance by lodgepole pine, subalpine fir/grouse whortleberry-grouse whortleberry is covered in another group. Stands in this group vary greatly in density and continuity due to rocky lands, avalanche paths, old burns and shrub fields. Although the discontinuity of forest cover may suggest the existence of some areas that have been exempt from past fires, Habeck and Mutch 18/ reported that searching has always yielded some charcoal in the subalpine fir/woodrush-menziesia habitat type located adjacent to this group; and Bigler 19/ found charred wood in all stands, even in stands supporting 300-year-old spruce, and estimated large fire periodicity at 250 to 400 years. Coniferous regeneration is extremely slow after fires. Revegetation of denuded areas by undergrowth plants is also slow, but such areas are likely to be small and scattered. The large infrequent stand replacement fires in this group generally start in adjacent drier sites.

FOOTNOTES

1/ Arno, S.F. 1977, The Historical Role of Fire on the Bitterroot National Forest. Research Paper INT-187, USDA Forest Service.

2/ Davis, K.M., Clayton, B.D., and Fisher, W.C., 1980, Fire Ecology of Lolo National Forest Habitat Types. USDA Forest Service General Technical Report INT-79. Intermountain Forest & Range Experiment Station, Ogden, Utah.

3/ On, D. and Losensky, John B., 1977, Ecoclass Identification for Region One, mimeographed.

4/ Habeck, J.R. and Mutch, R.W., 1973, Fire-dependent Forests. Northern Rocky Mountains Quarternary Research, Vol. 3, No. 3, Academic Press.

5/ Arno, S.F., 1976, op. cit.

6/ Pfister, R.D., Kovalchik, B.L., Arno, S.F. and Presby, R.C., 1977, Habitat Types of Montana. USDA General Technical Report INT-34.

7/ Sneck, K.M., 1977, The Fire History of Coram Experimental Forest. Master of Science Thesis, University of Montana.

8/ Miller, M., 1977, Response of Blue Huckleberry to Prescribed Fires in a Western Montana Larch-fir Forest. Research Paper INT-188, USDA Forest Service.

AND

Stickney, P.F., 1978, Data Base for Post-fire Succession, First 6 to 9 Years, in Montana Larch-fir Forest. Editorial Draft, USDA Forest Service.

9/ Habeck, James R., 1974, Forests, Fuels and Fire in the Selway-Bitterroot Wilderness, Idaho. Proceedings, Tall Timbers Fire Ecology Conference, Missoula, Montana.

10/ Arno, S.F., 1976, op. cit., Intermountain Forest and Range Experimental Station, USDA Forest Service.

11/ Sneck, K.M., 1977, op. cit.

12/ Lyon, J.L., and Stickney, P.F., 1974, Early Vegetal Succession Following Large Northern Rocky Mountain Wildfires. Tall Timbers Fire Ecology Conference, Missoula, Montana.

13/ Lyman, C.K., 1945, Principles of Fuel Reduction for the Northern Mountain Region. USDA Forest Service, Northern RM Forest and Range Experimental Station, Progress Report 1, 135 pages.

14/ Leiberg, J.B., 1904, Forest Conditions in the Abasaroka Division of the Yellowstone Forest Reserve. Montana U.S. Geological Survey Prof., p. 29.

15/ Brown, J.K., 1975, Fire Cycles and Community Dynamics in Lodgepole Pine Forests. USDA Forest Service INT, Forest and Range Experimental Station.

16/ Johnson, R.S., 1975, Soil Water Depletion by Lodgepole Pine on Glacial Till. USDA Forest Service Res. Note Int-199.

17/ Sturges, D.L., 1975, Hydrologic Relations on Undistrubed and Converted Big Sagebrush Lands: The Status of Our Knowledge. USDA Forest Service Research Paper RM-140.

18/ Habeck, J.R. and Mutch, R.W., 1973, Fire-dependent Forests, op. cit.

19/ Bigler, R.L., Age and Size Class Distribution in the Abies Lasiocarpa/Luzula Hitchcockii-Menziesia Habitat Type in Northwestern Montana. University of Idaho Forest and Range Experimental Station (pending publication).

appendix

L.T.- LTA-IVb | Classification: Andic Cryochrept, loamy-skeletal (mixed) | Date: 7/10/78 | By: HH | Photo # | Stop #

2. Area: Scapegoat | Forest: L&C | Ranger District: D-2 | State: MT | County | Location: SEC. 21 T. 19 N R. 10 W

3. Parent Rock: Sandstone | Formation Name | Surf. Stone & Rock %

4. Landform | Slope: 0-25% | Aspect: NW | Elev.: 6240 Ft. | Erosion | Gul. | Alk. | Sal.

H.T.- AF/Mefe | Precip. In. | Av. Temp. °F | Lit. Type | Infiltration: Moderate | Drain.: Medium | Water Tab. Ft.

6. HORIZON	DEPTH	COLOR Dry, Moist, Crushed / Mottling	TEXTURE	STRUCTURE	CONSIST. Dry, Moist Wet, Cem.	SPECIAL FEATURES: Clay Films	Stone Rock % Vol.	Roots	Pores		REACTION pH	BOUNDARY	PERCOLATION CLASS
O1	2-0"	Litter, duff, charcoal											
A2	0-2"	7.5YR 5/2		1	1mabk 2mgr	DSh MFr WSo,po		10%			ash cap		
B2ir	2-11"	7.5 YR 4/4		1	2mabk 2fgr	DSh MFr WSo,po		10%			Sand Stone		
IB2	11+"	7.5YR5/4		sl	1fgr	DSh MVfr WSo,po		70% Cobbles					

- closely spaced low order drainages don't understand why!

9. (Species) TREES (Amt.)	(Species) SHRUBS (Amt.)	(Species) FORBS (Amt.)	(Species) GRASSES (Amt.)

L.T.- LTA-IV | Classification: Typic Cryoboralf Fine-silty (mixed) | Date: 7/11/78 | By: HH | Photo # | Stop #

2. Area: Scapegoat | Forest: L&C | Ranger District: D-2 | State: MT | County | Location: SEC. 19 T. 19 N R. 10 W

3. Parent Rock: Limestone | Formation Name | Surf. Stone & Rock %

4. Landform: Block Glide Slump | Slope: 25-40% | Aspect: N | Elev.: 7000 Ft. | Erosion | Gul. | Alk. | Sal.

H.T.- AF/Xete, Vasc | Precip. In. | Av. Temp. °F | Lit. Type | Infiltration: Moderate | Drain. | Water Tab. Ft.

6. HORIZON	DEPTH	COLOR Dry, Moist, Crushed / Mottling	TEXTURE	STRUCTURE	CONSIST. Dry, Moist Wet, Cem.	SPECIAL FEATURES: Clay Films	Stone Rock % Vol.	Roots	Pores		REACTION pH	BOUNDARY	PERCOLATION CLASS
O1	3-0"	charcoal, needles, duff											
A2	0-4"	7.5YR 4/4	sil	1m abk 2mgr	D sh M Fr		10% gravel						
IIB2	4-24+	10YR5/4	sicl	2 m-f abk	D sh M Fr WSS,SP	mod patchy	20% vang gravel						

- Heavy clay loams are common, soil is wet but appears to have medium patchy clay films; benchy landform w/ a few seeps

9. (Species) TREES (Amt.)	(Species) SHRUBS (Amt.)	(Species) FORBS (Amt.)	(Species) GRASSES (Amt.)

L.T.- L.T.A. - Ib | Classification Typic Cryochrept, loamy-skeletal (mixed) | Date 7/10/78 | By HH | Photo # | Stop #

2. Area Scapegoat | Forest LEC | Ranger District | State MT | County | Location SEC. 16 T. 19 N R. 10 W | Surf. Stone & Rock %

3. Parent Rock Sandstone | Formation Name

4. Landform Glacial Scoured | Slope 0-40% | Aspect E | Elev. 6200 Ft. | Erosion | Gul. | Alk. | Sal.

H.T.- AF/Xete | Precip. In. | Av. Temp °F | Lit. Type | Infiltration Moderate | Drain. | Water Tab. Ft.

6. HORIZON	DEPTH	COLOR Dry, Moist, Crushed / Mottling	TEXTURE	STRUCTURE	CONSIST. Dry, Moist Wet, Cem.	SPECIAL FEATURES: Clay Films	Stone Rock % Vol.	Roots	Pores		REACTION pH	BOUNDARY	PERCOLATION CLASS
O_1	2-0"	Black charcoal, litter, duff											
A_2	0-4"	7.5YR4/2	Sil	1mabk 2mgr	DSH MFr WSS,po		Gravel 15%			mixed ash			
B_2	4-15"	10YR5/3	l	1mabk 1mgr	DSH MFr WSS,po		60% Cobbles						

9. (Species) TREES (Amt.)	(Species) SHRUBS (Amt.)	(Species) FORBS (Amt.)	(Species) GRASSES (Amt.)

L.T.- LTA-Ib | Classification Aquic Cryoboralf fine-silty (mixed) | Date 7/12/78 | By HH | Photo # | Stop #

2. Area Bob Marshall | Forest FLHD | Ranger District | State MT | County — | Location SEC. 11 T. 19 N R. 12 W | Surf. Stone & Rock %

3. Parent Rock | Formation Name

4. Landform Lacustrine | Slope 0-10% | Aspect | Elev. Ft. | Erosion | Gul. | Alk. | Sal.

H.T.- S/Yaca | Precip. In. | Av. Temp °F | Lit. Type | Infiltration Slow | Drain. | Water Tab. Ft.

6. HORIZON	DEPTH	COLOR Dry, Moist, Crushed / Mottling	TEXTURE	STRUCTURE	CONSIST. Dry, Moist Wet, Cem.	SPECIAL FEATURES: Clay Films	Stone Rock % Vol.	Roots	Pores		REACTION pH	BOUNDARY	PERCOLATION CLASS
O	2-0"	needles, rotted wood, charcoal											
A_2	0-6"	7.5YR5/2 fif rust mott.	Sil	1m abk	dh; MFi WSS,ps		—						
B_{2T}	6-14+	5YR4/4	Sicl	2m-f abk	Dh MFi WS,p	Mco clay film	—						

- Strongly developed cryoboralf, with water perching in the A_2 over the slowly permeable B_{2T}

9. (Species) TREES (Amt.)	(Species) SHRUBS (Amt.)	(Species) FORBS (Amt.)	(Species) GRASSES (Amt.)

PG/AHM

L.T.- LTA - Ia | Classification Histic Cryaquept, fine-silty (mixed) | Date 7/12/78 | By | Photo # | Stop # 9

2. Area Danaher Meadow | Forest FLHD | Ranger District | State | County | Location SEC. 8 T. 18N R. 11W

3. Parent Rock | Formation Name | Surf. Stone & Rock %

4. Landform Alluvial Bottom Wet | Slope 0 | Aspect Flat | Elev. 6200 Ft. | Erosion | Gul. | Alk. | Sal.

H.T. - | Precip. In. | Av. Temp. 50 °F | Lit. Type | Infiltration | Drain. | Water Tab. Ft.

6. HORIZON	DEPTH cm	COLOR Dry, Moist, Crushed / Moist	Mottling	TEXTURE	STRUCTURE	CONSIST. Dry, Moist Wet, Cem.	SPECIAL FEATURES: Clay Films	Stone Rock % Vol.	Roots	Pores	REACTION pH	BOUNDARY	PERCOLATION CLASS
A00	16-14	10YR 3/6 crushed		organic	-	WNS	-	-			7.0	gs	
Ao	14-10	10YR 2/1		organic	-	WNS	-	-			7.5	gs	
O1	10-0	10YR 2/1		organic	1fcr	M vfr WNS	-	-	②		7.5	cs	
IIBir21	0-8	10YR 3/4		si	2mpl	M vfr WSS	-	-	①		7.5	cw	
IIBir22	8-18	10YR 5/6		si	2mpl	M vfr WSS	-	-			7.5	cs	
IIIC1g	18-48	5YR 4/3		l	m	M WNS	-	5%			7.5	cs	
IVC2g	48-60	5YR 5/2	f-f mottles 5Y 5/8	sicl	m	M WP	-	-					

10°C - 50°F @ 20"

① Darker color may be due to dry root penetration

② organic material is sapric

9. (Species) TREES (Amt.)	(Species) SHRUBS (Amt.)	(Species) FORBS (Amt.)	(Species) GRASSES (Amt.)
	Bog Birch 25%	Aster	Rushes (small) 50%
	Patentilla 5%		grasses 20%
	Willow 3%		
			masses - 50%

L.T.- LTA- IV | Classification Typic Cryoboralf, loamy-skeletal (mixed) | Date 7/10/78 | By HH | Photo # | Stop #

2. Area Scapegoat | Forest L&C | Ranger District D-Z | State MT | County | Location SEC. 28 T. 19N R. 10W

3. Parent Rock | Formation Name | Surf. Stone & Rock %

4. Landform | Slope 25-60% | Aspect S | Elev. 6800 Ft. | Erosion | Gul. | Alk. | Sal.

H.T. - DF/Vagl | Precip. In. | Av. Temp. °F | Lit. Type | Infiltration Moderate | Drain. | Water Tab. Ft.

6. HORIZON	DEPTH	COLOR Dry, Moist, Crushed / Mottling	TEXTURE	STRUCTURE	CONSIST. Dry, Moist Wet, Cem.	SPECIAL FEATURES: Clay Films	Stone Rock % Vol.	Roots	Pores	REACTION pH	BOUNDARY	PERCOLATION CLASS
O1	2-0"	Black O.M. needles duff, charcoal										
A1	0-4"	7.5YR 4/2	sil	1 mabk - 2mgr	Dsh Mfr WSo, po		20%					
B2T	4-12"	5YR 4/3	sicl	2m-f abk	Dsh Mfr WS, P		40%					

Maybe old slump but unsure, well dissected and drained limestone could be residual or massive block glide.

9. (Species) TREES (Amt.)	(Species) SHRUBS (Amt.)	(Species) FORBS (Amt.)	(Species) GRASSES (Amt.)

L.T. – LTA - I | Classification: Aquic Cryofluvent fine-silty (ml) red | Date: 7/12/78 | By: DeAHM | Photo # | Stop # 12

2. Area: Danaher CK-Basin | Forest: FLHD | Ranger District | State | County | Location: SEC. 30 T. 19 N R. 11 W | + +

3. Parent Rock | Formation Name | Surf. Stone & Rock % + +

4. Landform: Alluvial Bottom | Slope: 1% | Aspect: Flat | Elev.: 5200 Ft. | Erosion | Gul. | Alk. | Sal.

H.T. – | Precip. In. | Av. Temp: 48 °F | Lit. Type | Infiltration | Drain. | Water Tab. Ft.

6. HORIZON	DEPTH cm	COLOR Dry, Moist, Crushed	Mottling	TEXTURE	STRUCTURE	CONSIST. Dry, Moist Wet, Cem.	SPECIAL FEATURES: Clay Films	Stone Rock % Vol.	Roots	Pores		REACTION pH	BOUNDARY	PERCOLATION CLASS
A_o	3-0		Needles and duff										cs	
A_{11}	0-8	10YR3/2		vfsl	1fpl	Mfr	-	-				7.5		
A_{12}	8-22	10YR3/2 10YR6/2	Variable LAYERED	vfsl	1cp 2fSBK	Mfr	-	-			-	7.5		
A_{2g}	22-40	10YR 3/2 10YR6/2	W/ Fif Mottles	vfsl	2mSBK	Mfr	-	-			-	8.0		
C_{1ca}	40-54	2.5Y6/2		Si	M	Mfr	-	-			Ev	8+		
C_{2b}	54-63	10YR2/1		Hv Si	M	Mfr	-	-			-	8.0		
II C_3	63+	red & green argillites						1/4" Dia			-	8.0		

9°C - 48°F @ 20"

9. (Species) TREES (Amt.)	(Species) SHRUBS (Amt.)	(Species) FORBS (Amt.)	(Species) GRASSES (Amt.)

L.T. – LTA - II | Classification: Andic Cryochrept, medial/loamy/skeletal | Date: 7/14/78 | By: AHM | Photo # | Stop # 19

2. Area: Jumbo MTN | Forest: FLHD | Ranger District: Big Prairie | State: MT | County | Location: SEC. 17 T. 14N R. 12W | + +

3. Parent Rock: Limestone | Formation Name: Devonian (Du) Dip Slope | Surf. Stone & Rock % + +

4. Landform: Cirque Basin | Slope: 10 | Aspect: NE | Elev.: 7840 Ft. | Erosion | Gul. | Alk. | Sal.

H.T. AF-AL/Luhi | Precip. In. | Av. Temp: 5 °C | Lit. Type | Infiltration | Drain: Well | Water Tab. Ft.

6. HORIZON	DEPTH cm	COLOR Dry, Moist, Crushed: Moist	Mottling	TEXTURE	STRUCTURE	CONSIST. Dry, Moist Wet, Cem.	SPECIAL FEATURES: Clay Films	Stone Rock % Vol.	Roots	Pores		REACTION pH	BOUNDARY	PERCOLATION CLASS
A_o	0-3		Duff + Litter layer				1/4"	albic	A_2					
Bir_{21}	3-8	7.5YR4/4		Sil	1 ABK- 2mgr			-						
B_{22}	8-15	7.5YR4/4		HvSil	2fgr			-						
IIC$_1$	15-51	-		vgr Sil	-			80-90% ①						

① Weathered sandy limestone

Temp 5°C or 40°F @ 12"

9. (Species) TREES (Amt.)	(Species) SHRUBS (Amt.)	(Species) FORBS (Amt.)	(Species) GRASSES (Amt.)
ES - ①			
Alpine larch ②			
A.F. - T ③			

L.T.- LTA - III

Classification: Andeptic Cryoboralf loamy-skeletal (mixed) | Date: 7/11 | By: DG-AHM | Photo #: | Stop #: 7

2. Area: Little Calf Creek | Forest: FLHD | Ranger District: Big Prairie | State: MT | County: | Location: SEC. 12 T. 18 N R. 12 W

3. Parent Rock: PEm | Formation Name: red argillite and siltite | Surf. Stone & Rock %:

4. Landform: Hummocky Ground Moraine | Slope: 15% | Aspect: S | Elev.: 5700 Ft. | Erosion: | Gul. | Alk. | Sal.

H.T. - AF/VACA | Precip. In. | Av. Temp. 10°C | Lit. Type | Infiltration | Drain.: Well | Water Tab. Ft.

6. HORIZON	DEPTH cm	COLOR Dry, Moist, Crushed	Mottling	TEXTURE	STRUCTURE	CONSIST. Dry, Moist Wet, Cem.	SPECIAL FEATURES: Clay Films	Stone Rock % Vol.	Roots	Pores		REACTION pH	BOUNDARY	PERCOLATION CLASS
Ao	3-0	5YR 3/2		Organic Mat - Mycillium abundant										
A1	0-3	5YR 2/2		sil	1f cr	Mvfr						5.0		
Bir	3-10	2.5YR 3/6		gr sil	2f cr	Mvfr		5%				5.0		
II A2	10-28	5YR 4/3		grls	2m SBK	Mfr		35%				5.5		
II A+B	28-46	5YR 5/3		grsl	2m SBK	Mfr		30%				5.8		
II B2T	46-52	2.5YR 4/4		gr l	2m SBK	Mfi	few clay flows	40%				5.8		
C	52-60+	2.5YR 4/4		grsl	M	Mvfi		40%				6.0		
				10°C - 50°F @ 20"										

9. (Species) TREES (Amt.)	(Species) SHRUBS (Amt.)	(Species) FORBS (Amt.)	(Species) GRASSES (Amt.)
AF	Xete	Lupine	

L.T.- LTA IV

Classification: Typic Cryoboralf, fine-silty (mixed) | Date: 7/12 | By: AHM | Photo #: | Stop #: 10

2. Area: Danaher Basin | Forest: FLHD | Ranger District: SBRD | State: MT | County: LBC | Location: SEC. 8 T. 18 N R. 11 W

3. Parent Rock: Argillite & Limestone | Formation Name: PEm + Eu | Surf. Stone & Rock %:

4. Landform: Dissected Lacustrine | Slope: 10% | Aspect: E | Elev.: 5400 Ft. | Erosion: | Gul. | Alk. | Sal.

H.T. - ABLA/VACA | Precip. In. | Av. Temp. 47 °F | Lit. Type | Infiltration | Drain. | Water Tab. Ft.

6. HORIZON	DEPTH cm	COLOR Dry, Moist, Crushed	Mottling	TEXTURE	STRUCTURE	CONSIST. Dry, Moist Wet, Cem.	SPECIAL FEATURES: Clay Films	Stone Rock % Vol.	Roots	Pores		REACTION pH	BOUNDARY	PERCOLATION CLASS
Ao	4-0			Duff Layer										
A1	0-2	10YR 2/2		Sil	1f cr						① -	4.5		
A2	2-12	7.5YR 5/2		sil	2m pl						-	5.0		
A&B	12-34	5YR 5/3		Hv Sil	2m pl - 2m SBK		Thin clay films				E	7.0		
B2T	34-44	5YR 4/2		Sicl	2m SBK		Thick clay flows				Ev	8.0		
C	44-60	5YR 6/3		Si	pl-m						Ev	8+		
				8°C - 47°F @ 20"				No loess cap						
				① A, contains considerable charcoal (Ranch site below)										

9. (Species) TREES (Amt.)	(Species) SHRUBS (Amt.)	(Species) FORBS (Amt.)	(Species) GRASSES (Amt.)

L.T.- LTA - V b | Classification: Typic Cryochrept, Loamy-Skeletal (mixed) | Date: 7/17/78 | By: DO AHM | Photo # | Stop # 5

2. Area: DANAHER area | Forest: FLHD | Ranger District: SBRD | State: MT | County: LEC | Location: SEC. 4 T. 18 N R. 11 W

3. Parent Rock: pEm | Formation Name: Green Siltite | Surf. Stone & Rock %

4. Landform: Ridgetop - convex | Slope: 15% breaking to 40% | Aspect: NE | Elev.: 5900 Ft. | Erosion | Gul. | Alk. | Sal.

H.T.: DF/Carn - Caru | Precip. In. | Av. Temp °F | Lit. Type | Infiltration | Drain. | Water Tab. Ft.

6. HORIZON	DEPTH cm	COLOR Dry, Moist, Crushed — MOIST	Mottling	TEXTURE	STRUCTURE	CONSIST. Dry, Moist Wet, Cem.	SPECIAL FEATURES: Clay Films	Stone Rock % Vol.	Roots	Pores	REACTION pH	BOUNDARY	PERCOLATION CLASS
Ao	3-0	10YR 2/2		gr sil		Mvfr		5%			6.0		
A11	0-8	10YR 4/2		gr fsl	1f cr	Mfr		30%			5.0		
A12	8-30	7.5YR 4/2		vgr sl	1m cr	Mfr		65%			5.5		
IIC1	30-40	10YR 5/3		vgr sl	2m SBK	Mfi		65%			5.8		
R	40+	-		-	M	-		90%					

Temp 8°C or 45°F @ 20"

changes to AF/Libo 100' Downslope

9. (Species) TREES (Amt.)	(Species) SHRUBS (Amt.)	(Species) FORBS (Amt.)	(Species) GRASSES (Amt.)
DF - 3	Spbe	Strawberry	Caru
ES - (T;)		glacier lily	
LPP		Vetch	

L.T.- LTA - III (incl. of Ib) | Classification: Andic Cryochrept, Loamy-Skeletal (mixed) | Date: 7/24/78 | By: DO AHM | Photo # | Stop # 6

2. Area: Little Calf Creek | Forest: FLHD | Ranger District: SBRD | State: MT | County: LEC | Location: SEC. 6 T. 18 N R. 11 W

3. Parent Rock: Red Argillite & Quartzite | Formation Name: pEm middle missoula | Surf. Stone & Rock %

4. Landform: Bench Terrace | Slope: 3% | Aspect: Flat | Elev.: 5400 Ft. | Erosion | Gul. | Alk. | Sal.

H.T.: ABLA/VACA | Precip. In. | Av. Temp °F | Lit. Type | Infiltration | Drain. | Water Tab. Ft.

6. HORIZON	DEPTH cm	COLOR Dry, Moist, Crushed — Mottling	TEXTURE	STRUCTURE	CONSIST. Dry, Moist Wet, Cem.	SPECIAL FEATURES: Clay Films	Stone Rock % Vol.	Roots	Pores	REACTION pH	BOUNDARY	PERCOLATION CLASS
Ao	3-0	10YR 2/2	Duff lager twigs & needles							-		
Bir	0-28	7.5YR 4/4	sil	1f cr	Mvfr	-	15%	PLNTFL		5.5	CW	
IIB2	28-40	5YR 4/3	gr l	1m SBK	mfr		25%	few		5.5	GW	
IIC	40+	5YR 4/3	vgr ls	sg	mfr		50%			6.0		

sand & gravel

- gravels are 60% 1/4-3/4" 20% 3/4-3" 10% 3"+

- Temp 8°C - 45°F @ 20"

A11 4" 5YR 2/2 — II Drainage - Prarie Veg. in

A12 10" 5YR 3/2 — near by meadow

9. (Species) TREES (Amt.)	(Species) SHRUBS (Amt.)	(Species) FORBS (Amt.)	(Species) GRASSES (Amt.)
LPP	Juniper	Tall Vaca (15cm)	Caru
SAF		aruv	Horsetail
ES (T)		Patenulla	
WBP (T) Seedling			

L.T.- LTA - Ib | Classification: Typic Cryoborall (mixed) loamy-skeletal | Date | By: HH | Photo # | Stop # 1

2. Area: Bob Marshall | Forest: FLHD | Ranger District | State: MT | County | Location: SEC. 11 T. 19 N R. 12 W

3. Parent Rock | Formation Name | Surf. Stone & Rock %

4. Landform: Glacial Outwash Terrace | Slope: 0-10% | Aspect: W | Elev. Ft. | Erosion | Gul. | Alk. | Sal.

H.T. - | Precip. In. | Av. Temp. °F | Lit. Type | Infiltration: Mod Rapid | Drain. | Water Tab. Ft.

6. HORIZON	DEPTH	COLOR Dry, Moist, Crushed / Mottling	TEXTURE	STRUCTURE	CONSIST. Dry, Moist Wet, Cem.	SPECIAL FEATURES: Clay Films	Stone Rock % Vol.	Roots	Pores	REACTION pH	BOUNDARY	PERCOLATION CLASS
A_1	0-8"	7.5YR 3/2	SL	2m vf gr	D sq m vfr w so, po		40% rounded gravels					
B_2	8-15+	5 YR 4/4	SL	1m gr	D sh m vfr w so, po		60%					

9. (Species) TREES (Amt.)	(Species) SHRUBS (Amt.)	(Species) FORBS (Amt.)	(Species) GRASSES (Amt.)

L.T.- LTA - VIII | Classification: Andeptic Cryoboralf (mixed) loamy-skeletal | Date: 7/14/71 | By: A.H.M. H.H. | Photo # | Stop #

2. Area: Jumbo Mtn | Forest: FLHD | Ranger District | State: MT | County | Location: SEC. T. R.

3. Parent Rock: Limestone | Formation Name: Du (Devonian Undiff) | Surf. Stone & Rock %

4. Landform | Slope | Aspect: N | Elev.: 6000 Ft. | Erosion | Gul. | Alk. | Sal.

H.T. - AF/Xete | Precip. In. | Av. Temp.: 9.5°C | Lit. Type | Infiltration | Drain.: Well | Water Tab. Ft.

6. HORIZON	DEPTH	COLOR Dry, Moist, Crushed / Mottling	TEXTURE	STRUCTURE	CONSIST. Dry, Moist Wet, Cem.	SPECIAL FEATURES: Clay Films	Stone Rock % Vol.	Roots	Pores	REACTION pH	BOUNDARY	PERCOLATION CLASS
	cm	moist										
A_0	2-0	10YR 2/2	Duff	and	Needles							
B_{ir21}	0-8	7.5YR 4/4	sil		mvfr		5%			—	6.0	
B_{ir22}	8-18	7.5YR 5/6	sil		mvfr		10%			E	6.0	
$IIA+B_{2t}$	18-28	2.5Y 7/6 10YR 4/3	sicl		mfi wsep		35%			Ev	8.0	
$II\ B_{3ca}$	28-38	2.5Y 7/6	sil		mfi wsep		60%			Ev	8.0+	
R	38+	Du Limestone					80%+			Ev		

9. (Species) TREES (Amt.)	(Species) SHRUBS (Amt.)	(Species) FORBS (Amt.)	(Species) GRASSES (Amt.)

L.T.- LTA - Ib | Classification: Aquic Cryoboroll/loamy-skeletal/(mixed) | Date: 7/10/78 | By: Dx Amm | Photo # | Stop # 3

2. Area: Danaher Cabin | Forest: FLHD | Ranger District: Big Prairie | State: MT | County | Location: SEC. 5 T. 18 N R. 11 W

3. Parent Rock: pE m | Formation Name: Missoula | Surf. Stone & Rock %

4. Landform: Alluvial Fan | Slope: 3% | Aspect: W | Elev.: 5200 Ft. | Erosion | Gul. | Alk. | Sal.

H.T.- LPP/Feid | Precip. In. | Av. Temp. 12°C | Lit. Type | Infiltration | Drain.: Excess | Water Tab. Ft.

6. HORIZON	DEPTH cm	COLOR Dry, Moist, Crushed — Moist	COLOR — Mottling	TEXTURE	STRUCTURE	CONSIST. Dry, Moist Wet, Cem.	SPECIAL FEATURES: Clay Films	Stone Rock % Vol.	Roots	Pores	REACTION pH	BOUNDARY	PERCOLATION CLASS
A11	0-25	5YR3/1		sil	1f cr	mvfr	-	5%	Many		6.0	gw	
A12	25-40	5YR 2/2	7.5YR4/2	gr fsl	1f cr	mvfr	-	30%	Many		6.0	gw	
A13	40-60	5YR 2/2		gr fsl	1f cr	mfr	-	35%	Many		6.0	gw	
C	60+	7.5YR3/2		vgr fs	sg	ml	-	80% ①	Few		6.0		

① gravels 1/4 to 3/4" few to 1½", green siltite, red quartzite or siliceous argillite

② Temp 12°C - 55°F @ 20"

- administrative site - good, sub-irrigated pasture soils range from gr sil fluvents to 10-20" of
- shape is convex/convex

9. (Species) TREES (Amt.)	(Species) SHRUBS (Amt.)	(Species) FORBS (Amt.)	(Species) GRASSES (Amt.)
LPP - T	Po Fr - 1	MTN Dandylion	Resc - 3
	Geutri - T	Beard Tounge	Feid - 2

- Dwarf Huckleberry in understory (LPP) in adjoining area
- No SAF or DF evident

L.T.- LTA - III | Classification: Typic Cryoboroll coarse-loamy (mixed) | Date: 7/10/78 | By: Amm | Photo # | Stop # 4

2. Area: Danaher Basin | Forest: FLHD | Ranger District: SBRD | State: MT | County: FLHD | Location: SEC. 4 T. 18 N R. 11 W

3. Parent Rock: Eu | Formation Name | Surf. Stone & Rock %

4. Landform: Ice Margin Lacustrine | Slope: 10% | Aspect: W | Elev.: 5200 Ft. | Erosion | Gul. | Alk. | Sal.

H.T.- S/Yaca | Precip. In. | Av. Temp °F | Lit. Type | Infiltration | Drain. | Water Tab. Ft.

6. HORIZON	DEPTH cm	COLOR Dry, Moist, Crushed — Mottling	TEXTURE	STRUCTURE	CONSIST. Dry, Moist Wet, Cem.	SPECIAL FEATURES: Clay Films	Stone Rock % Vol.	Roots	Pores		REACTION pH	BOUNDARY	PERCOLATION CLASS
Ao	2.5-0		organic Duff Layer										
A11	0-5	10YR3/2	sil	1f cr	mvfr	-	-	M			7.0		
A12	5-10	7.5YR3/2	sil	1m SBK 2f cr	mvfr	-	-	M			7.5		
A13	10-30	5YR 4/2	vfsl	2m SBK	mfr	-	-	M		Es	8.0		
Cca	30-65	7.5YR 6/2	vfsl	1C Pl - M	M	-	-	F		Ev	8.0+		

Calcareous vfsl from sand dune ?
Disected lacustrine bench

9. (Species) TREES (Amt.)	(Species) SHRUBS (Amt.)	(Species) FORBS (Amt.)	(Species) GRASSES (Amt.)
LPP	showey cinquefoil	strawberries	caru
DF	Aruv	Lupine (sicky)	fesc
ES		Anemonoe Nuttida	

MONTANA HABITAT TYPE FIELD FORM

R1- 2410-15H (6/77)

NAME D. On

DATE 7/10/78

(CODE DESCRIPTION)

TOPOGRAPHY:
1-Ridge
2-Upper slope
3-Mid slope
4-Lower slope
5-Bench or flat
6-Stream bottom

HORIZONTAL CONFIGURATION:
1-Convex (dry)
2-Straight
3-Concave (wet)
4-Undulating

CANOPY COVERAGE CLASS:
0=Absent 3=25 to 50%
T=Rare to 1% 4=50 to 75%
1=1 to 5% 5=75 to 95%
2=5 to 25% 6=95 to 100%

NOTE: Rate trees (>4" dbh) and regen (0-4" dbh) separately (e.g., 4/2)

Plot No.	1		2		
Location	S 33 T 18N		S 33 T 18N		
T, R, S	R 11 W		R 11 W		
Elevation	5400		5400		
Aspect	W		SW		
Slope	3	%	50	%	%
Topography	5		4		
Configuration	2		2		

TREES Scientific Name	Abbrev	Common Name	Canopy Coverage Class		
1. Abies grandis	ABGR	grand fir	T		
2. Abies lasiocarpa	ABLA	subalpine fir	T		
3. Larix lyallii	LALY	alpine larch			
4. Larix occidentalis	LAOC	western larch			
5. Picea engelmannii	PIEN	Engelmann spruce	1		
6. Picea glauca	PIGL	white spruce			
7. Pinus albicaulis	PIAL	whitebark pine			
8. Pinus contorta	PICO	lodgepole pine	1	T	
9. Pinus flexilis	PIFL	limber pine			
10. Pinus monticola	PIMO	western white pine			
11. Pinus ponderosa	PIPO	ponderosa pine	T	T	
12. Pseudotsuga menziesii	PSME	Douglas-fir	T	T	
13. Thuja plicata	THPL	western redcedar			
14. Tsuga heterophylla	TSHE	western hemlock			
15. Tsuga mertensiana	TSME	mountain hemlock			
SHRUBS AND SUBSHRUBS					
1. Alnus sinuata	ALSI	Sitka alder			
2. Arctostaphylos uva-ursi	ARUV	kinnikinnick	T	3	
3. Berberis repens	BERE	creeping Oregon grape	T	T	
4. Cornus canadensis	COCA	bunchberry dogwood			
5. Holodiscus discolor	HODI	ocean spray			
6. Juniperus communis (+ horizontalis)	JUCO	common (+ creeping) juniper	T	T	
7. Ledum glandulosum	LEGL	Labrador tea	T		
8. Linnaea borealis	LIBO	twinflower	2		
9. Menziesia ferruginea	MEFE	menziesia	T		
10. Oplopanax horridum	OPHO	devil's club			
11. Physocarpus malvaceus	PHMA	ninebark			
12. Prunus virginiana	PRVI	chokecherry			
3. Purshia tridentata	PUTR	bitterbrush			
4. Ribes montigenum	RIMO	mountain gooseberry			
15. Shepherdia canadensis	SHCA	buffaloberry	T	T	
16. Spiraea betulifolia	SPBE	white spiraea	T		
17. Symphoricarpos albus	SYAL	common snowberry			
18. Symphoricarpos oreophilus	SYOR	mountain snowberry			
19. Vaccinium caespitosum	VACA	dwarf huckleberry	3		
20. Vaccinium globulare (+ membranaceum)	VAGL	blue huckleberry			
21. Vaccinium scoparium (+ myrtillus)	VASC	grouse whortleberry	2		
PERENNIAL GRAMINOIDS					
1. Agropyron spicatum	AGSP	bluebunch wheatgrass		1	
2. Andropogon spp.	AND	bluestem			
3. Calamagrostis canadensis	CACA	bluejoint			
4. Calamagrostis rubescens	CARU	pinegrass	3		
5. Carex geyeri	CAGE	elk sedge		2	
6. Festuca idahoensis	FEID	Idaho fescue			
7. Festuca scabrella	FESC	rough fescue		1	
8. Luzula hitchcockii (= glabrata)	LUHI	wood-rush			
PERENNIAL FORBS AND FERNS					
1. Actaea rubra	ACRU	baneberry			
2. Antennaria racemosa	ANRA	woods pussytoes			
3. Aralia nudicaulis	ARNU	wild sarsaparilla			
4. Arnica cordifolia	ARCO	heartleaf arnica	T		
5. Athyrium filix-femina	ATFI	lady fern			
6. Balsamorhiza sagittata	BASA	arrowleaf balsamroot			
7. Clematis pseudoalpina (+ tenuiloba)	CLPS	virgin's bower			
8. Clintonia uniflora	CLUN	queencup beadlily			
9. Equisetum arvense	EQAR	common horsetail			
10. Equisetum spp.	EQU	horsetails & scouring rush			
11. Galium triflorum	GATR	sweetscented bedstraw			
12. Gymnocarpium dryopteris	GYDR	oak fern			
13. Senecio streptanthifolius	SEST	cleft-leaf groundsel			
14. Senecio triangularis	SETR	arrowleaf groundsel			
15. Smilacina stellata	SMST	starry Solomon's seal			
16. Streptopus amplexifolius	STAM	twisted stalk			
17. Thalictrum occidentale	THOC	western meadowrue			
18. Valeriana sitchensis	VASI	sitka valerian			
19. Viola orbiculata	VIOR	round-leaved violet			
20. Xerophyllum tenax	XETE	beargrass			
SERIES			Abla	Psme	
HABITAT TYPE			Vasc	Cage	
PHASE					

PUBLISHED AS PART OF "FOREST HABITAT TYPES OF MONTANA" - INT 1977

USDA-FOREST SERVICE

Pop tre T Pop tre

Juni sco T only one plant in area

MONTANA HABITAT TYPE FIELD FORM

R1- 2410-15H (6/77)

NAME D. Ow

DATE 7/10/78

	Plot No.	Location	T, R, S	Elevation	Aspect	Slope	Topography	Configuration
	6	S 6 T 18N R 11W		5300	Flat	0 %	5	2
	5	S 4 T 18N R 11W		5900	NE	15 %	1	1
	4	S 4 T 18N R 11W		5200	W	10 %	4	2

(CODE DESCRIPTION)

TOPOGRAPHY: 1-Ridge, 2-Upper slope, 3-Mid slope, 4-Lower slope, 5-Bench or flat, 6-Stream bottom

HORIZONTAL CONFIGURATION: 1-Convex (dry), 2-Straight, 3-Concave (wet), 4-Undulating

CANOPY COVERAGE CLASS: 0=Absent, T=Rare to 1%, 1=1 to 5%, 2=5 to 25%, 3=25 to 50%, 4=50 to 75%, 5=75 to 95%, 6=95 to 100%

NOTE: Rate trees (>4" dbh) and regen (0-4" dbh) separately (e.g., 4/2)

TREES Scientific Name	Abbrev	Common Name	Canopy Coverage Class		
1. Abies grandis	ABGR	grand fir	T		
2. Abies lasiocarpa	ABLA	subalpine fir	T		
3. Larix lyallii	LALY	alpine larch			
4. Larix occidentalis	LAOC	western larch			
5. Picea engelmannii	PIEN	Engelmann spruce	T	T	T
6. Picea glauca	PIGL	white spruce			
7. Pinus albicaulis	PIAL	whitebark pine	T		1
8. Pinus contorta	PICO	lodgepole pine	3	T	2
9. Pinus flexilis	PIFL	limber pine			
10. Pinus monticola	PIMO	western white pine			
11. Pinus ponderosa	PIPO	ponderosa pine			
12. Pseudotsuga menziesii	PSME	Douglas-fir	T	3	T
13. Thuja plicata	THPL	western redcedar			
14. Tsuga heterophylla	TSHE	western hemlock			
15. Tsuga mertensiana	TSME	mountain hemlock			
SHRUBS AND SUBSHRUBS					
1. Alnus sinuata	ALSI	Sitka alder			
2. Arctostaphylos uva-ursi	ARUV	kinnikinnick	2		2
3. Berberis repens	BERE	creeping Oregon grape			T
4. Cornus canadensis	COCA	bunchberry dogwood			
5. Holodiscus discolor	HODI	ocean spray			
6. Juniperus communis (+ horizontalis)	JUCO	common (+ creeping) juniper	T		T
7. Ledum glandulosum	LEGL	Labrador tea			
8. Linnaea borealis	LIBO	twinflower			T
9. Menziesia ferruginea	MEFE	menziesia	T		
10. Oplopanax horridum	OPHO	devil's club			
11. Physocarpus malvaceus	PHMA	ninebark			
12. Prunus virginiana	PRVI	chokecherry			
3. Purshia tridentata	PUTR	bitterbrush			
4. Ribes montigenum	RIMO	mountain gooseberry			
15. Shepherdia canadensis	SHCA	buffaloberry	T		T
16. Spiraea betulifolia	SPBE	white spiraea	T	2	
17. Symphoricarpos albus	SYAL	common snowberry	T		T
18. Symphoricarpos oreophilus	SYOR	mountain snowberry			
19. Vaccinium caespitosum	VACA	dwarf huckleberry	3		T
20. Vaccinium globulare (+ membranaceum)	VAGL	blue huckleberry			
21. Vaccinium scoparium (+ myrtillus)	VASC	grouse whortleberry	2		
PERENNIAL GRAMINOIDS					
1. Agropyron spicatum	AGSP	bluebunch wheatgrass			
2. Andropogon spp.	AND	bluestem			
3. Calamagrostis canadensis	CACA	bluejoint			
4. Calamagrostis rubescens	CARU	pinegrass	2	4	3
5. Carex geyeri	CAGE	elk sedge	1		
6. Festuca idahoensis	FEID	Idaho fescue			
7. Festuca scabrella	FESC	rough fescue			T
8. Luzula hitchcockii (= glabrata)	LUHI	wood-rush			
PERENNIAL FORBS AND FERNS					
1. Actaea rubra	ACRU	baneberry			
2. Antennaria racemosa	ANRA	woods pussytoes	T	T	
3. Aralia nudicaulis	ARNU	wild sarsaparilla			
4. Arnica cordifolia	ARCO	heartleaf arnica	T	T	
5. Athyrium filix-femina	ATFI	lady fern		T	
6. Balsamorhiza sagittata	BASA	arrowleaf balsamroot			
7. Clematis pseudoalpina (+ tenuiloba)	CLPS	virgin's bower			
8. Clintonia uniflora	CLUN	queencup beadlily			
9. Equisetum arvense	EQAR	common horsetail			
10. Equisetum spp.	EQU	horsetails & scouring rush			T
11. Galium triflorum	GATR	sweetscented bedstraw			
12. Gymnocarpium dryopteris	GYDR	oak fern			
13. Senecio streptanthifolius	SEST	cleft-leaf groundsel			
14. Senecio triangularis	SETR	arrowleaf groundsel			
15. Smilacina stellata	SMST	starry Solomon's seal			T
16. Streptopus amplexifolius	STAM	twisted stalk			
17. Thalictrum occidentale	THOC	western meadowrue		T	
18. Valeriana sitchensis	VASI	sitka valerian			
19. Viola orbiculata	VIOR	round-leaved violet			
20. Xerophyllum tenax	XETE	beargrass			
SERIES			Abla	Psme	Picea ?
HABITAT TYPE			Vaca	Carn	Vaca
PHASE				Carn	

PUBLISHED AS PART OF "FOREST HABITAT TYPES OF MONTANA" - INT 1977

USDA-FOREST SERVICE

T AF/Libo 100' down north slope

T if present in stand

? Probably Abla series

OVER

2410-15H (6/74)

MONTANA HABITAT TYPE FIELD FORM | NAME D. On | DATE 7/11/78

(CODE DESCRIPTION)

TOPOGRAPHY:
1-Ridge
2-Upper slope
3-Mid slope
4-Lower slope
5-Bench or flat
6-Streambottom

HORIZONTAL CONFIGURATION:
1-Convex (dry)
2-Straight
3-Concave (wet)
4-Undulating

VEGETATION COVERAGE: CLASS (1%)
0-None
T-Rare to 1%
1-1 to 5
2-5 to 25
3-25 to 50
4-50 to 75
5-75 to 95
6-95 to 100

Plot No.	7	8	10
Location	S 12	S 15	S 8
T, R, S	T18N R12W	T18N R12W	T19N R11W
Elevation	5700	6600	5400
Aspect	SE	NE	E
Slope	15 %	20 %	10 %
Topography	4	6	5
Configuration	3	3	1

NOTE: Rate trees (> 4") and regen (0-4") separately (e.g., 4/2)

TREES Scientific Name	Abbrev	Common Name			
1. Abies grandis	GF	Grand fir	T	T	T
2. Abies lasiocarpa	AF	Subalpine fir	1	1	T
3. Larix lyallii	AL	Alpine larch	T	T	T
4. Larix occidentalis	WL	Western larch	T	T	T
5. Picea engelmannii	ES	Engelmann spruce	T	1	T
6. Picea glauca	WS	White spruce	T	T	T
7. Pinus albicaulis	WBP	Whitebark pine	T	T	T
8. Pinus contorta	LPP	Lodgepole pine	4	1	4
9. Pinus flexilis	PF	Limber pine	T	T	T
10. Pinus monticola	WP	Western white pine	T	T	T
11. Pinus ponderosa	PP	Ponderosa pine	T	T	T
12. Pseudotsuga menziesii	DF	Douglas-fir	T	T	T
13. Thuja plicata	WRC	Western red cedar	T	T	T
14. Tsuga heterophylla	WH	Western hemlock	T	T	T
15. Tsuga mertensiana	MH	Mountain hemlock	T	T	T
SHRUBS					
1. Alnus sinuata	Alsi	Mountain alder	1	1	—
2. Arctostaphylos uva-ursi	Aruv	Kinnikinnick	—	—	T
3. Berberis repens	Bere	Creeping Oregon grape	1	—	—
4. Cornus canadensis	Coca	Bunchberry dogwood	—	—	—
5. Holodiscus discolor	Hodi	Ocean spray	—	—	—
6. Juniperus communis (+ horizontalis)	Juco	Common (+ creeping) juniper	T	—	T
7. Ledum glandulosum	Legl	Laborador tea	—	—	—
8. Linnaea borealis	Libo	Twin flower	—	—	2
9. Menziesia ferruginea	Mefe	Menziesia	—	3	T
10. Oplopanax horridum	Opho	Devil's club	—	—	—
Physocarpus malvaceus	Phma	Ninebark	—	—	—
Prunus virginiana	Prvi	Chokecherry	—	—	—
Purshia tridentata	Putr	Bitterbrush	—	—	—
14. Ribes montigenum	Rimo	Mountain gooseberry	—	—	—
15. Shepherdia canadensis	Shca	Buffalo-berry	—	—	T
16. Spiraea betulifolia	Apbe	White spirea	1	—	—
17. Symphoricarpos albus	Syal	Snowberry	—	—	—
18. Vaccinium caespitosum	Vaca	Dwarf huckleberry	—	—	3
19. Vaccinium globulare (membranaceum)	Vagl	Blue huckleberry	T	T	—
20. Vaccinium scoparium (+ myrtillus)	Vasc	Grouse whortelberry	5	1	—
PERENNIAL GRAMINOIDS					
1. Agropyron spicatum	Agsp	Bluebunch wheatgrass	—	—	—
2. Andropogon spp.	ANDR	Bluestem	—	—	—
3. Calamagrostis canadensis	Caca	Bluejoint	—	—	—
4. Calamagrostis rubescens	Caru	Pinegrass	T	—	3
5. Carex geyeri	Cage	Elk sedge	—	—	T
6. Festuca idahoensis	Feid	Idaho fescue	—	—	—
7. Festuca scabrella	Fesc	Rough fescue	—	—	—
8. Luzula hitchcockii (glabrata)	Luhi	Wood-rush	—	—	—
PERENNIAL FORBS					
1. Actaea rubra	Acru	Baneberry	—	—	—
2. Antenaria racemosa	Anra	Woods pussytoes	—	—	—
3. Aralia nudicaulis	Arnu	Wild sarsaparilla	—	—	—
4. Arnica cordifolia	Arco	Heartleaf arnica	T	T	T
5. Athyrium filix-femina	Atfi	Lady fern	—	—	—
6. Balsamorhiza sagittata	Basa	Arrowleaf balsamroot	—	—	—
7. Clematis pseudoalpina (+ tenuiloba)	Clps	Virgin's bower	—	—	—
8. Clintonia uniflora	Clun	Queen cup beadlily	—	—	—
9. Equisetum arvense	Eqar	Common horsetail	—	—	—
10. Equisetum spp.	EQUI	Horsetails & scouring rush	—	—	—
11. Galium triflorum	Gatr	Sweetscented bedstraw	—	—	—
12. Gymnocarpium dryopteris	Gydr	Oak fern	—	—	—
13. Senecio streptanthifolius	Sest	Cleft leaf groundsel	—	—	—
14. Senecio triangularis	Setr	Arrowleaf groundsel	—	T	—
15. Smilacina stellata	Smst	Starry Solomon's seal	—	—	—
16. Streptopus amplexifolius	Stam	Twisted stalk	—	T	—
Thalictrum occidentale	ThOc	Western meadowrue	—	T	T
Valeriana sitchensis	Vasi	Sitka valerian	—	—	—
Viola orbiculata	Vior	Round-leaved violet	—	T	T
Xerophyllum tenax	Xete	Beargrass	T	2	—
SERIES			Abla	Abla	Abla
HABITAT TYPE			Vasc	Luhi	Caca
PHASE			Vasc	Mefe	

// Micro-si te

MONTANA HABITAT TYPE FIELD FORM — R1- 2410-15H (6/77)

NAME D.On

DATE 7/12/78 — 7/13

Plot No.	11	12	13
Location	S8 T18N R11W	S31 T19N R11W	S14 T19N R12W
T, R, S			
Elevation	5600	5200	5200
Aspect	Flat	Flat	W
Slope	2 %	0-1 %	15 %
Topography	5	2	3
Configuration	2	2	4

(CODE DESCRIPTION)

HORIZONTAL CONFIGURATION: 1-Convex (dry) 2-Straight 3-Concave (wet) 4-Undulating

TOPOGRAPHY: 1-Ridge 2-Upper slope 3-Mid slope 4-Lower slope 5-Bench or flat 6-Stream bottom

CANOPY COVERAGE CLASS: 0=Absent 3=25 to 50% T=Rare to 1% 4=50 to 75% 1=1 to 5% 5=75 to 95% 2=5 to 25% 6=95 to 100%

NOTE: Rate trees (>4" dbh) and regen (0-4" dbh) separately (e.g., 4/2)

No AF in plot

TREES Scientific Name	Abbrev	Common Name	Canopy Coverage Class		
1. Abies grandis	ABGR	grand fir	T 1	T	
2. Abies lasiocarpa	ABLA	subalpine fir			
3. Larix lyallii	LALY	alpine larch			
4. Larix occidentalis	LAOC	western larch			
5. Picea engelmannii	PIEN	Engelmann spruce		3 1	T
6. Picea glauca	PIGL	white spruce			
7. Pinus albicaulis	PIAL	whitebark pine			
8. Pinus contorta	PICO	lodgepole pine	2 T 1	2	4 T
9. Pinus flexilis	PIFL	limber pine			
10. Pinus monticola	PIMO	western white pine			
11. Pinus ponderosa	PIPO	ponderosa pine			
12. Pseudotsuga menziesii	PSME	Douglas-fir	2	T	
13. Thuja plicata	THPL	western redcedar			
14. Tsuga heterophylla	TSHE	western hemlock			
15. Tsuga mertensiana	TSME	mountain hemlock			
SHRUBS AND SUBSHRUBS					
1. Alnus sinuata	ALSI	Sitka alder			
2. Arctostaphylos uva-ursi	ARUV	kinnikinnick	T		T
3. Berberis repens	BERE	creeping Oregon grape		T	
4. Cornus canadensis	COCA	bunchberry dogwood			
5. Holodiscus discolor	HODI	ocean spray			
6. Juniperus communis (+ horizontalis)	JUCO	common (+ creeping) juniper	T		T
7. Ledum glandulosum	LEGL	Labrador tea			
8. Linnaea borealis	LIBO	twinflower		T	
9. Menziesia ferruginea	MEFE	menziesia			
10. Oplopanax horridum	OPHO	devil's club			
11. Physocarpus malvaceus	PHMA	ninebark			
12. Prunus virginiana	PRVI	chokecherry			
3. Purshia tridentata	PUTR	bitterbrush			
4. Ribes montigenum	RIMO	mountain gooseberry			
15. Shepherdia canadensis	SHCA	buffaloberry			2
16. Spiraea betulifolia	SPBE	white spiraea			
17. Symphoricarpos albus	SYAL	common snowberry	T		T
18. Symphoricarpos oreophilus	SYOR	mountain snowberry			
19. Vaccinium caespitosum	VACA	dwarf huckleberry			
20. Vaccinium globulare (+ membranaceum)	VAGL	blue huckleberry			T
21. Vaccinium scoparium (+ myrtillus)	VASC	grouse whortleberry			T
PERENNIAL GRAMINOIDS					
1. Agropyron spicatum	AGSP	bluebunch wheatgrass			
2. Andropogon spp.	AND	bluestem			
3. Calamagrostis canadensis	CACA	bluejoint			
4. Calamagrostis rubescens	CARU	pinegrass			
5. Carex geyeri	CAGE	elk sedge	L		4
6. Festuca idahoensis	FEID	Idaho fescue			
7. Festuca scabrella	FESC	rough fescue			
8. Luzula hitchcockii (= glabrata)	LUHI	wood-rush	T		
PERENNIAL FORBS AND FERNS					
1. Actaea rubra	ACRU	baneberry			
2. Antennaria racemosa	ANRA	woods pussytoes			
3. Aralia nudicaulis	ARNU	wild sarsaparilla			
4. Arnica cordifolia	ARCO	heartleaf arnica	T		T
5. Athyrium filix-femina	ATFI	lady fern			
6. Balsamorhiza sagittata	BASA	arrowleaf balsamroot			
7. Clematis pseudoalpina (+ tenuiloba)	CLPS	virgin's bower			
8. Clintonia uniflora	CLUN	queencup beadlily			
9. Equisetum arvense	EQAR	common horsetail			
10. Equisetum spp.	EQU	horsetails & scouring rush		T	
11. Galium triflorum	GATR	sweetscented bedstraw			
12. Gymnocarpium dryopteris	GYDR	oak fern			
13. Senecio streptanthifolius	SEST	cleft-leaf groundsel			
14. Senecio triangularis	SETR	arrowleaf groundsel			
15. Smilacina stellata	SMST	starry Solomon's seal		T	
16. Streptopus amplexifolius	STAM	twisted stalk			
17. Thalictrum occidentale	THOC	western meadowrue		4	T
18. Valeriana sitchensis	VASI	sitka valerian			
19. Viola orbiculata	VIOR	round-leaved violet			
20. Xerophyllum tenax	XETE	beargrass			
		SERIES	Psme	Picea	Picea
		HABITAT TYPE	Casc-2	Libo	Vaca
		PHASE	Arnu		

PUBLISHED AS PART OF "FOREST HABITAT TYPES OF MONTANA" - INT 1977

USDA-FOREST SERVICE

1/ On ecotone Mitella Gervis T nuda Lup ser 1 Ely gla T.

2/ DF down logs Libo & Rha aln T. Vaca on wet margin of hf toe Gal bor 2

MONTANA HABITAT TYPE FIELD FORM

R1- 2410-15H (6/77)

ME D.O., H. Holdorf

DATE 7/14/78

	17	18	19
Plot No.			
Location	S9 T19N R12W	S16 T19N R12W	S16 T19N R12W
Elevation	5600	5600	6000
Aspect	N	N	S
Slope	55 %	30 %	30 %
Topography	2	2	2
Configuration	2	2	2

(CODE DESCRIPTION)

HORIZONTAL CONFIGURATION:
1-Convex (dry)
2-Straight
3-Concave (wet)
4-Undulating

TOPOGRAPHY:
1-Ridge
2-Upper slope
3-Mid slope
4-Lower slope
5-Bench or flat
6-Stream bottom

CANOPY COVERAGE CLASS:
0=Absent 3=25 to 50%
T=Rare to 1% 4=50 to 75%
1=1 to 5% 5=75 to 95%
2=5 to 25% 6=95 to 100%

NOTE: Rate trees (>4" dbh) and regen (0-4" dbh) separately (e.g., 4/2)

TREES Scientific Name	Abbrev	Common Name	Canopy Coverage Class		
1. Abies grandis	ABGR	grand fir	T	T	T
2. Abies lasiocarpa	ABLA	subalpine fir	1	T	1
3. Larix lyallii	LALY	alpine larch	T	T	
4. Larix occidentalis	LAOC	western larch		1	1
5. Picea engelmannii	PIEN	Engelmann spruce	1	1	T
6. Picea glauca	PIGL	white spruce	T	T	T
7. Pinus albicaulis	PIAL	whitebark pine	T	T	T
8. Pinus contorta	PICO	lodgepole pine	2	T	1
9. Pinus flexilis	PIFL	limber pine	T	T	T
10. Pinus monticola	PIMO	western white pine	T	T	T
11. Pinus ponderosa	PIPO	ponderosa pine	T	T	T
12. Pseudotsuga menziesii	PSME	Douglas-fir	2	T	1
13. Thuja plicata	THPL	western redcedar	1	1	1
14. Tsuga heterophylla	TSHE	western hemlock	1	1	1
15. Tsuga mertensiana	TSME	mountain hemlock	1	1	1
SHRUBS AND SUBSHRUBS					
1. Alnus sinuata	ALSI	Sitka alder	1	T	1
2. Arctostaphylos uva-ursi	ARUV	kinnikinnick	1	1	1
3. Berberis repens	BERE	creeping Oregon grape	1	1	1
4. Cornus canadensis	COCA	bunchberry dogwood	1	1	1
5. Holodiscus discolor	HODI	ocean spray	1	1	1
6. Juniperus communis (+ horizontalis)	JUCO	common (+ creeping) juniper	1	1	1
7. Ledum glandulosum	LEGL	Labrador tea	1	1	1
8. Linnaea borealis	LIBO	twinflower	1	1	1
9. Menziesia ferruginea	MEFE	menziesia	1	1	1
10. Oplopanax horridum	OPHO	devil's club	1	1	1
11. Physocarpus malvaceus	PHMA	ninebark	1	1	1
12. Prunus virginiana	PRVI	chokecherry	1	1	1
13. Purshia tridentata	PUTR	bitterbrush	1	1	1
14. Ribes montigenum	RIMO	mountain gooseberry	1	1	1
15. Shepherdia canadensis	SHCA	buffaloberry	1	1	1
16. Spiraea betulifolia	SPBE	white spiraea	1	1	1
17. Symphoricarpos albus	SYAL	common snowberry	1	1	2
18. Symphoricarpos oreophilus	SYOR	mountain snowberry	1	1	1
19. Vaccinium caespitosum	VACA	dwarf huckleberry	1	1	1
20. Vaccinium globulare (+ membranaceum)	VAGL	blue huckleberry	1	1	1
21. Vaccinium scoparium (+ myrtillus)	VASC	grouse whortleberry	1	1	1
PERENNIAL GRAMINOIDS					
1. Agropyron spicatum	AGSP	bluebunch wheatgrass	1	1	1
2. Andropogon spp.	AND	bluestem	1	1	1
3. Calamagrostis canadensis	CACA	bluejoint	1	1	1
4. Calamagrostis rubescens	CARU	pinegrass	1	1	1
5. Carex geyeri	CAGE	elk sedge	1	1	1
6. Festuca idahoensis	FEID	Idaho fescue	1	1	1
7. Festuca scabrella	FESC	rough fescue	1	1	1
8. Luzula hitchcockii (= glabrata)	LUHI	wood-rush	1	1	1
PERENNIAL FORBS AND FERNS					
1. Actaea rubra	ACRU	baneberry	1	1	1
2. Antennaria racemosa	ANRA	woods pussytoes	1	1	1
3. Aralia nudicaulis	ARNU	wild sarsaparilla	1	1	1
4. Arnica cordifolia	ARCO	heartleaf arnica	2	2	1
5. Athyrium filix-femina	ATFI	lady fern	1	1	1
6. Balsamorhiza sagittata	BASA	arrowleaf balsamroot	1	1	1
7. Clematis pseudoalpina (+ tenuiloba)	CLPS	virgin's bower	1	1	1
8. Clintonia uniflora	CLUN	queencup beadlily	1	1	1
9. Equisetum arvense	EQAR	common horsetail	1	1	1
10. Equisetum spp.	EQU	horsetails & scouring rush	1	1	1
11. Galium triflorum	GATR	sweetscented bedstraw	1	1	1
12. Gymnocarpium dryopteris	GYDR	oak fern	1	1	1
13. Senecio streptanthifolius	SEST	cleft-leaf groundsel	1	1	1
14. Senecio triangularis	SETR	arrowleaf groundsel	1	1	1
15. Smilacina stellata	SMST	starry Solomon's seal	1	1	1
16. Streptopus amplexifolius	STAM	twisted stalk	1	1	1
17. Thalictrum occidentale	THOC	western meadowrue	1	1	1
18. Valeriana sitchensis	VASI	sitka valerian	1	1	1
19. Viola orbiculata	VIOR	round-leaved violet	1	T	T
20. Xerophyllum tenax	XETE	beargrass	T	T	T
		SERIES	Abla	Abla	Abla ?
		HABITAT TYPE	Arco	Xete	Vagl
		PHASE		Vagl	

Pamy 2
Ast con 2
Salix T

Burned in '36?
Vagl not well represented

PUBLISHED AS PART OF "FOREST HABITAT TYPES OF MONTANA" - INT 1977

USDA-FOREST SERVICE

MONTANA HABITAT TYPE FIELD FORM

R1- 2410-15H (6/77)

NAME D.O.N

(CODE DESCRIPTION)

TOPOGRAPHY: 1-Ridge, 2-Upper slope, 3-Mid slope, 4-Lower slope, 5-Bench or flat, 6-Stream bottom

HORIZONTAL CONFIGURATION: 1-Convex (dry), 2-Straight, 3-Concave (wet), 4-Undulating

CANOPY COVERAGE CLASS: 0=Absent, T=Rare to 1%, 1=1 to 5%, 2=5 to 25%, 3=25 to 50%, 4=50 to 75%, 5=75 to 95%, 6=95 to 100%

NOTE: Rate trees (>4" dbh) and regen (0-4" dbh) separately (e.g., 4/2)

DATE			7/14/78	7/15/78		
Plot No.			30	2	22	
Location			S17 T	S3 T19N	S25T20N	
T, R, S			R	R11W	R12W	
Elevation			7840	5620	5880	
Aspect			NE	W	NW	
Slope			30 %	25 %	40 %	
Topography			2	3	3	
Configuration			3	1	2	
TREES	Scientific Name	Abbrev	Common Name	Canopy Coverage Class		
1.	Abies grandis	ABGR	grand fir			
2.	Abies lasiocarpa	ABLA	subalpine fir	1		
3.	Larix lyallii	LALY	alpine larch	1		
4.	Larix occidentalis	LAOC	western larch			
5.	Picea engelmannii	PIEN	Engelmann spruce	2	T	
6.	Picea glauca	PIGL	white spruce			
7.	Pinus albicaulis	PIAL	whitebark pine	1		
8.	Pinus contorta	PICO	lodgepole pine		2	3
9.	Pinus flexilis	PIFL	limber pine		1	2
10.	Pinus monticola	PIMO	western white pine			
11.	Pinus ponderosa	PIPO	ponderosa pine			
12.	Pseudotsuga menziesii	PSME	Douglas-fir		1	1
13.	Thuja plicata	THPL	western redcedar			
14.	Tsuga heterophylla	TSHE	western hemlock			
15.	Tsuga mertensiana	TSME	mountain hemlock			
SHRUBS AND SUBSHRUBS						
1.	Alnus sinuata	ALSI	Sitka alder			
2.	Arctostaphylos uva-ursi	ARUV	kinnikinnick		T	
3.	Berberis repens	BERE	creeping Oregon grape			
4.	Cornus canadensis	COCA	bunchberry dogwood			
5.	Holodiscus discolor	HODI	ocean spray			
6.	Juniperus communis (+ horizontalis)	JUCO	common (+ creeping) juniper		T	
7.	Ledum glandulosum	LEGL	Labrador tea			
8.	Linnaea borealis	LIBO	twinflower			
9.	Menziesia ferruginea	MEFE	menziesia			
10.	Oplopanax horridum	OPHO	devil's club			
11.	Physocarpus malvaceus	PHMA	ninebark			
12.	Prunus virginiana	PRVI	chokecherry			
13.	Purshia tridentata	PUTR	bitterbrush			
14.	Ribes montigenum	RIMO	mountain gooseberry			
15.	Shepherdia canadensis	SHCA	buffaloberry		2	1
16.	Spiraea betulifolia	SPBE	white spiraea			
17.	Symphoricarpos albus	SYAL	common snowberry		2	2
18.	Symphoricarpos oreophilus	SYOR	mountain snowberry			
19.	Vaccinium caespitosum	VACA	dwarf huckleberry			
20.	Vaccinium globulare (+ membranaceum)	VAGL	blue huckleberry			
21.	Vaccinium scoparium (+ myrtillus)	VASC	grouse whortleberry	3		2
PERENNIAL GRAMINOIDS						
1.	Agropyron spicatum	AGSP	bluebunch wheatgrass			
2.	Andropogon spp.	AND	bluestem			
3.	Calamagrostis canadensis	CACA	bluejoint			
4.	Calamagrostis rubescens	CARU	pinegrass		2	2
5.	Carex geyeri	CAGE	elk (sedge		T	
6.	Festuca idahoensis	FEID	Idaho fescue			
7.	Festuca scabrella	FESC	rough fescue			
8.	Luzula hitchcockii (= glabrata)	LUHI	wood-rush	T		
PERENNIAL FORBS AND FERNS						
1.	Actaea rubra	ACRU	baneberry			
2.	Antennaria racemosa	ANRA	woods pussytoes			T
3.	Aralia nudicaulis	ARNU	wild sarsaparilla			
4.	Arnica cordifolia	ARCO	heartleaf arnica			
5.	Athyrium filix-femina	ATFI	lady fern			
6.	Balsamorhiza sagittata	BASA	arrowleaf balsamroot			
7.	Clematis pseudoalpina (+ tenuiloba)	CLPS	virgin's bower			
8.	Clintonia uniflora	CLUN	queencup beadlily			
9.	Equisetum arvense	EQAR	common horsetail			
10.	Equisetum spp.	EQU	horsetails & scouring rush			
11.	Galium triflorum	GATR	sweetscented bedstraw			
12.	Gymnocarpium dryopteris	GYDR	oak fern			
13.	Senecio streptanthifolius	SEST	cleft-leaf groundsel			
14.	Senecio triangularis	SETR	arrowleaf groundsel			
15.	Smilacina stellata	SMST	starry Solomon's seal			
16.	Streptopus amplexifolius	STAM	twisted stalk			
17.	Thalictrum occidentale	THOC	western meadowrue		T	T
18.	Valeriana sitchensis	VASI	sitka valerian	T		
19.	Viola orbiculata	VIOR	round-leaved violet	T		T
20.	Xerophyllum tenax	XETE	beargrass	T		
			SERIES	Abla	Psme	Abla
			HABITAT TYPE	Caly-Abla	Syal	Xete
			PHASE		Carn	Vasc

Phylempt T ? Accid?
Trollax T
Weakly
Calcareous
Sandstone

PUBLISHED AS PART OF "FOREST HABITAT TYPES OF MONTANA" - INT 1977

USDA-FOREST SERVICE

(over)

MONTANA HABITAT TYPE FIELD FORM

R1- 2410-15H (6/77)

ME H. Hocdorf, AL MARTINSON

(CODE DESCRIPTION)

HORIZONTAL

TOPOGRAPHY: 1-Ridge, 2-Upper slope, 3-Mid slope, 4-Lower slope, 5-Bench or flat, 6-Stream bottom

CONFIGURATION: 1-Convex (dry), 2-Straight, 3-Concave (wet), 4-Undulating

CANOPY COVERAGE CLASS: 0=Absent, T=Rare to 1%, 1=1 to 5%, 2=5 to 25%, 3=25 to 50%, 4=50 to 75%, 5=75 to 95%, 6=95 to 100%

NOTE: Rate trees (>4" dbh) and regen (0-4" dbh) separately (e.g., 4/2)

DATE	7/16/78	23	24 R 25
Plot No.		23	24
Location			
T, R, S		S27, T19N, R12W	S5-T18N-R12W
Elevation		5500	6000
Aspect		S	E
Slope		45 %	30% % %
Topography		4	1
Configuration		2	1
		Woollen CR.	

TREES Scientific Name	Abbrev	Common Name	Canopy Coverage Class	
1. Abies grandis	ABGR	grand fir	T / T	T / T
2. Abies lasiocarpa	ABLA	subalpine fir	T / T	1 / 2
3. Larix lyallii	LALY	alpine larch	T / T	T / T
4. Larix occidentalis	LAOC	western larch	T / T	T / T
5. Picea engelmannii	PIEN	Engelmann spruce	T / T	T / 1
6. Picea glauca	PIGL	white spruce	T / T	T / T
7. Pinus albicaulis	PIAL	whitebark pine	T / T	1 / T
8. Pinus contorta	PICO	lodgepole pine	4 / T	3 / T
9. Pinus flexilis	PIFL	limber pine	T / T	T / T
10. Pinus monticola	PIMO	western white pine	T / T	T / T
11. Pinus ponderosa	PIPO	ponderosa pine	T / T	T / T
12. Pseudotsuga menziesii	PSME	Douglas-fir	T / T	T / T
13. Thuja plicata	THPL	western redcedar	T / T	T / T
14. Tsuga heterophylla	TSHE	western hemlock	T / T	T / T
15. Tsuga mertensiana	TSME	mountain hemlock	T / T	T / T
SHRUBS AND SUBSHRUBS				
1. Alnus sinuata	ALSI	Sitka alder	T	T
2. Arctostaphylos uva-ursi	ARUV	kinnikinnick	1	T
3. Berberis repens	BERE	creeping Oregon grape	T	T
4. Cornus canadensis	COCA	bunchberry dogwood	T	T
5. Holodiscus discolor	HODI	ocean spray	T	T
6. Juniperus communis (+ horizontalis)	JUCO	common (+ creeping) juniper	T	T
7. Ledum glandulosum	LEGL	Labrador tea	T	T
8. Linnaea borealis	LIBO	twinflower	T	T
9. Menziesia ferruginea	MEFE	menziesia	T	2
10. Oplopanax horridum	OPHO	devil's club	T	T
11. Physocarpus malvaceus	PHMA	ninebark	T	T
12. Prunus virginiana	PRVI	chokecherry	T	T
3. Purshia tridentata	PUTR	bitterbrush	T	T
1. Ribes montigenum	RIMO	mountain gooseberry	T	T
. Shepherdia canadensis	SHCA	buffaloberry	T	T
6. Spiraea betulifolia	SPBE	white spiraea	1	T
17. Symphoricarpos albus	SYAL	common snowberry	T	T
18. Symphoricarpos oreophilus	SYOR	mountain snowberry	T	T
19. Vaccinium caespitosum	VACA	dwarf huckleberry	T	T
20. Vaccinium globulare (+ membranaceum)	VAGL	blue huckleberry	2	2
21. Vaccinium scoparium (+ myrtillus)	VASC	grouse whortleberry	T	2
PERENNIAL GRAMINOIDS				
1. Agropyron spicatum	AGSP	bluebunch wheatgrass	T	T
2. Andropogon spp.	AND	bluestem	T	T
3. Calamagrostis canadensis	CACA	bluejoint	T	T
4. Calamagrostis rubescens	CARU	pinegrass	1	T
5. Carex geyeri	CAGE	elk sedge	T	T
6. Festuca idahoensis	FEID	Idaho fescue	T	T
7. Festuca scabrella	FESC	rough fescue	T	T
8. Luzula hitchcockii (= glabrata)	LUHI	wood-rush	T	T
PERENNIAL FORBS AND FERNS				
1. Actaea rubra	ACRU	baneberry	T	T
2. Antennaria racemosa	ANRA	woods pussytoes	T	T
3. Aralia nudicaulis	ARNU	wild sarsaparilla	T	T
4. Arnica cordifolia	ARCO	heartleaf arnica	T	T
5. Athyrium filix-femina	ATFI	lady fern	T	T
6. Balsamorhiza sagittata	BASA	arrowleaf balsamroot	T	T
7. Clematis pseudoalpina (+ tenuiloba)	CLPS	virgin's bower	T	T
8. Clintonia uniflora	CLUN	queencup beadlily	T	T
9. Equisetum arvense	EQAR	common horsetail	T	T
10. Equisetum spp.	EQU	horsetails & scouring rush	T	T
11. Galium triflorum	GATR	sweetscented bedstraw	T	T
12. Gymnocarpium dryopteris	GYDR	oak fern	T	T
13. Senecio streptanthifolius	SEST	cleft-leaf groundsel	T	T
14. Senecio triangularis	SETR	arrowleaf groundsel	T	T
15. Smilacina stellata	SMST	starry Solomon's seal	T	T
16. Streptopus amplexifolius	STAM	twisted stalk	T	T
17. Thalictrum occidentale	THOC	western meadowrue	T	T
18. Valeriana sitchensis	VASI	sitka valerian	T	T
19. Viola orbiculata	VIOR	round-leaved violet	T	T
20. Xerophyllum tenax	XETE	beargrass	T	T
SERIES			PF	Abla
HABITAT TYPE			VAGL	Luhi
PHASE				Mefe

PUBLISHED AS PART OF "FOREST HABITAT TYPES OF MONTANA" - INT 1977

USDA-FOREST SERVICE

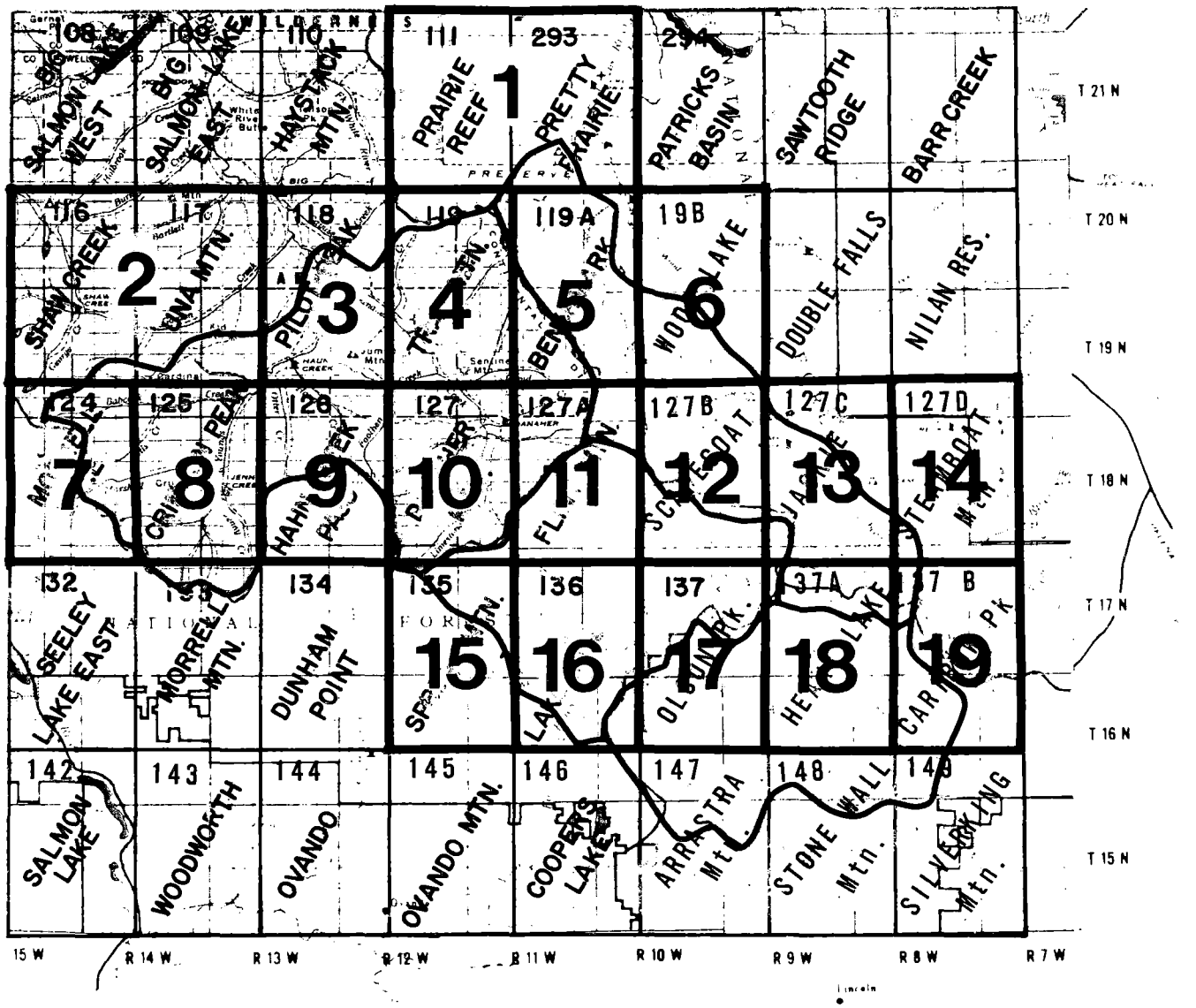
Typic Cryochept, loamy skel., mixed, Quartzite.

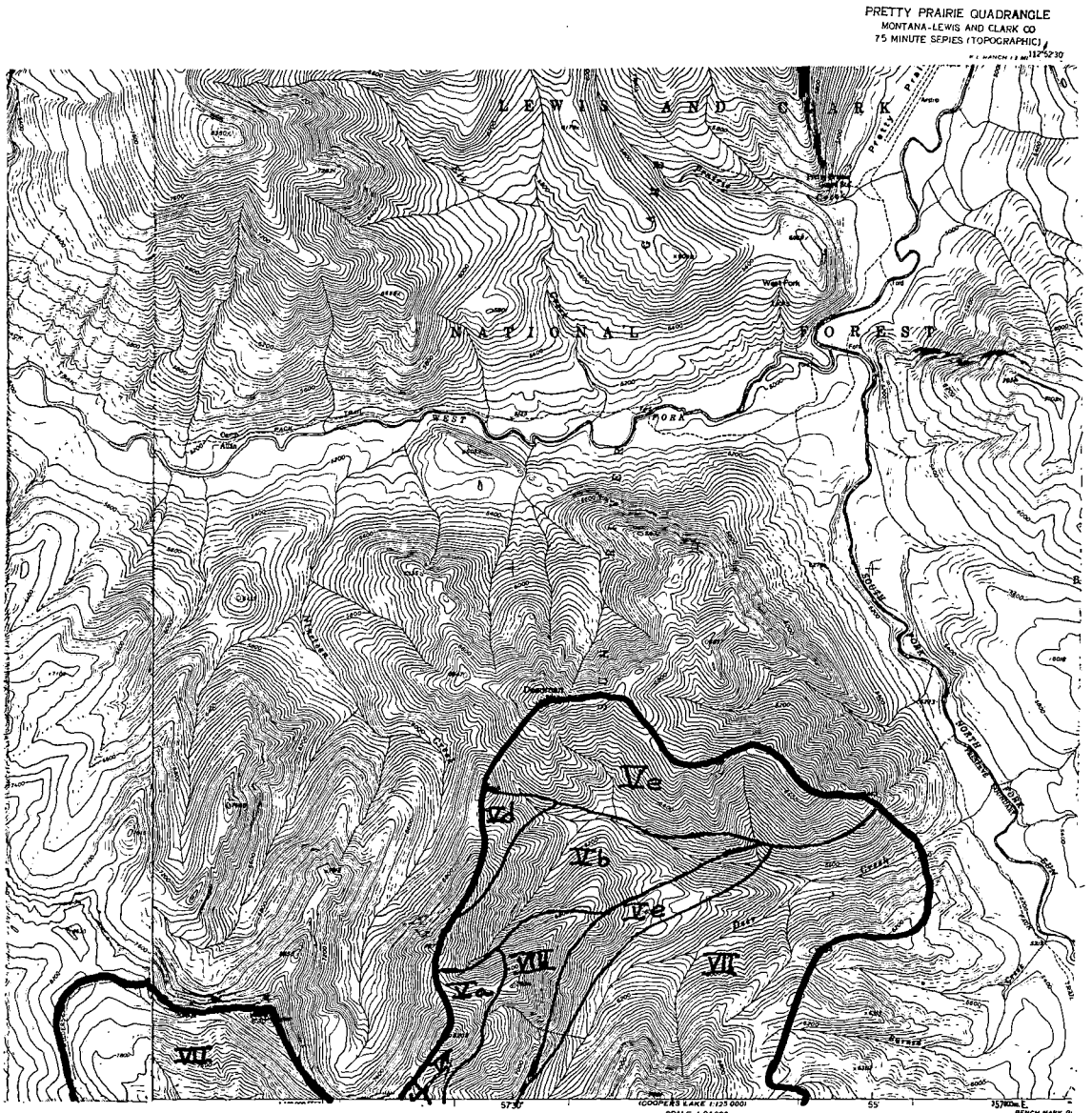
Andic Cryochept, lo. skel, mixed, *11, Quartzite

Lowest elevation for WBP

Map Index

Danaher - Scapegoat
Land Type Association Map
USFS - Region I



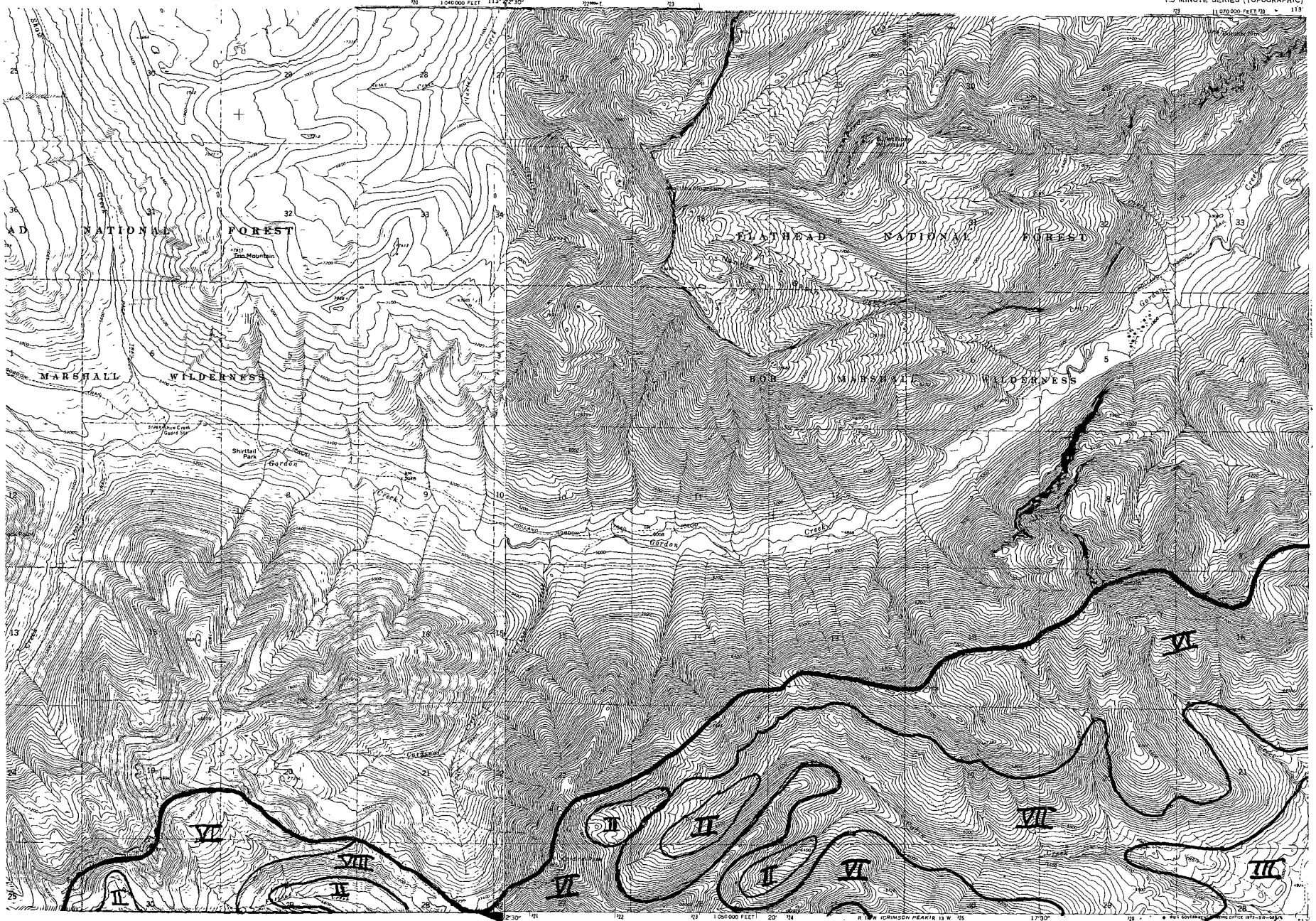


LAND TYPE ASSOCIATION MAP

DANAHER-SCAPE GOAT AREA

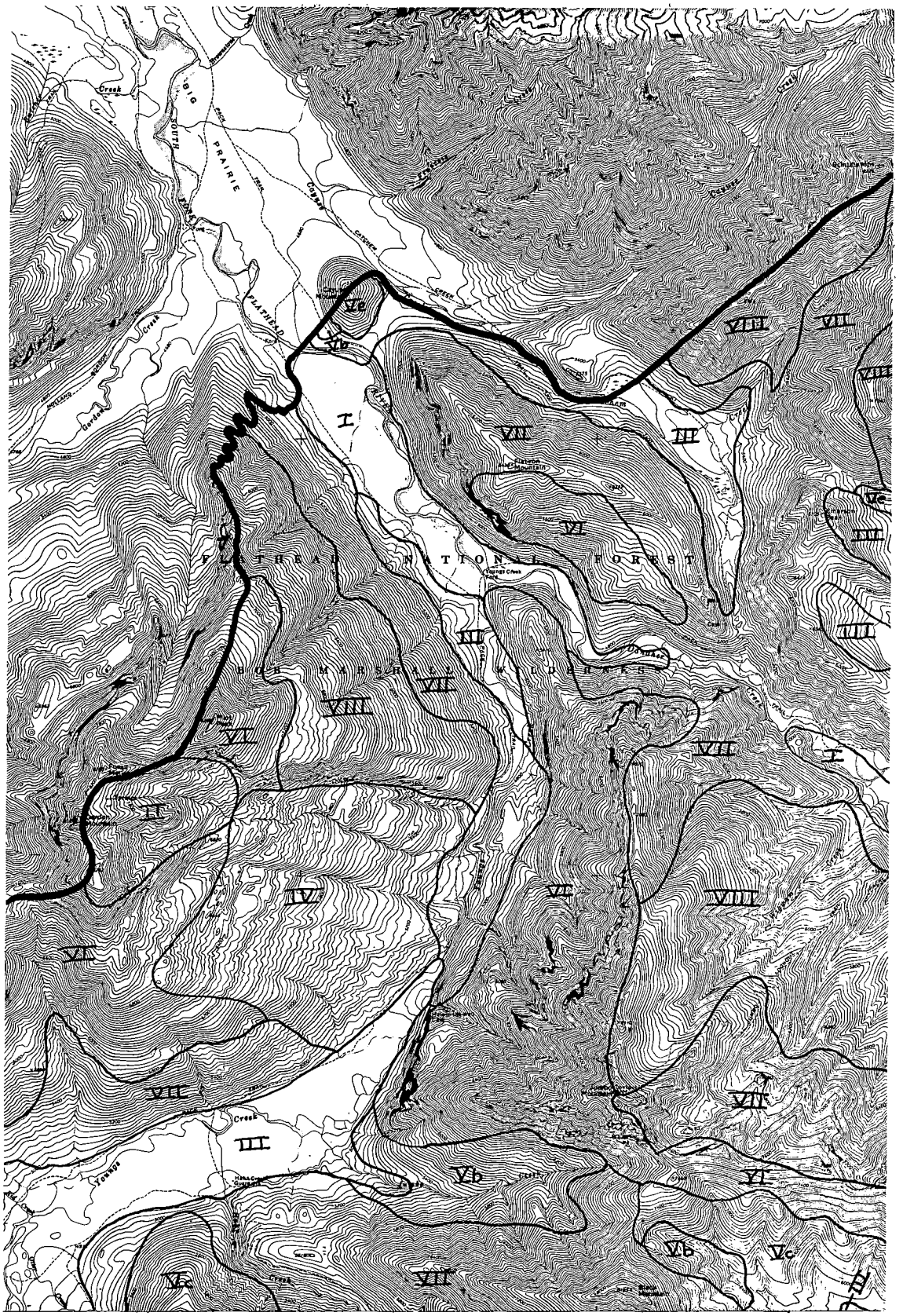
USFS REGION 1

SCALE: 1:63,360 MAY 1979



LAND TYPE ASSOCIATION MAP
DANAHER-SCAPE GOAT AREA
USFS REGION 1
SCALE: 1:63,360 MAY 1979

2



LAND TYPE ASSOCIATION MAP

DANAHER-SCAPE GOAT AREA

USFS REGION 1

SCALE: 1:63,360 MAY 1979

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

TRAP MOUNTAIN QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)

SCALE 1:24000

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

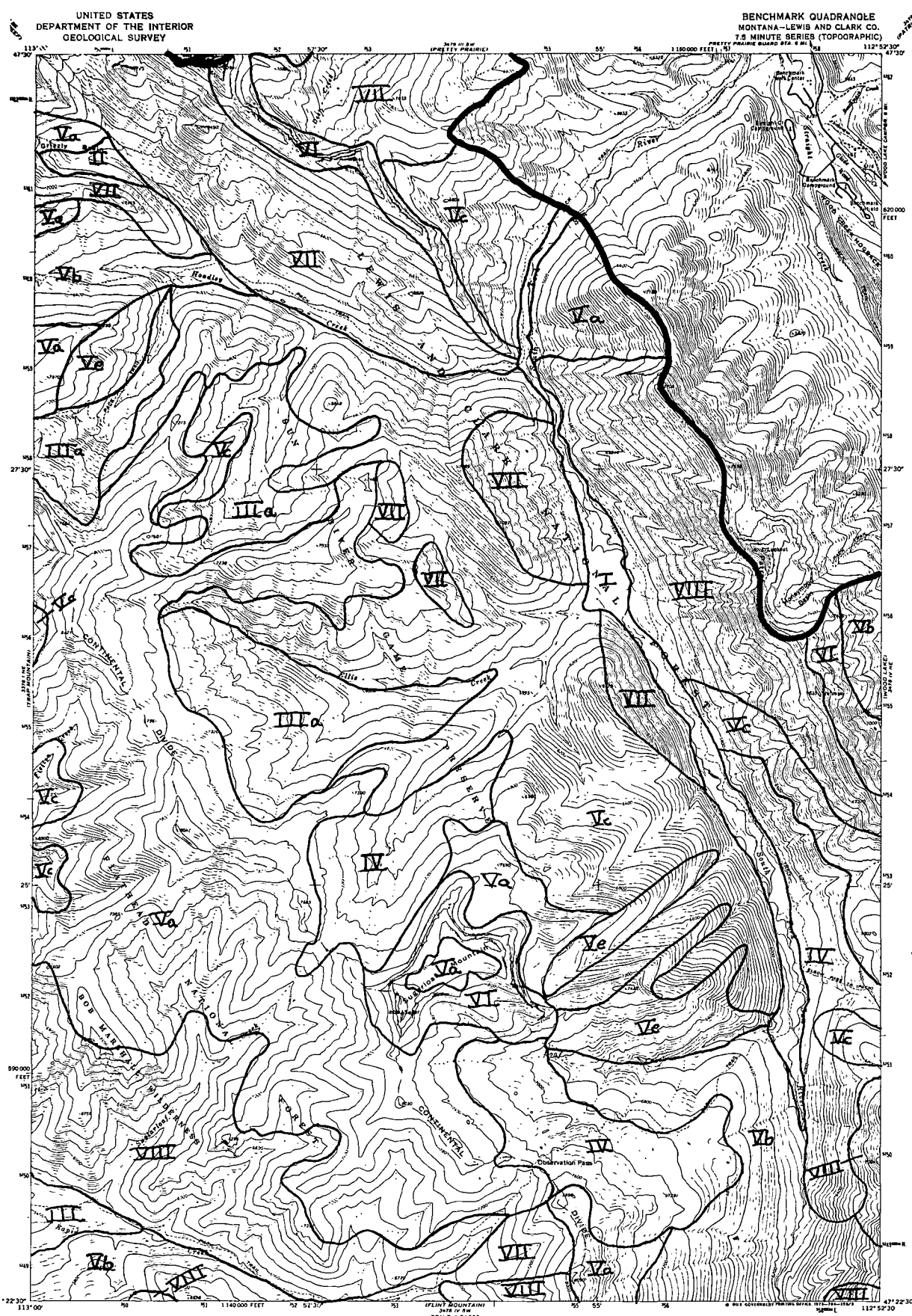
THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR WASHINGTON, D.C. 20242
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

ROAD CLASSIFICATION
Trails

QUADRANGLE LOCATION

TRAP MOUNTAIN,
N4722.5—W11300/7.5
1970

LAND TYPE ASSOCIATION MAP
DANAHER-SCAPE GOAT AREA
USFS REGION 1
SCALE: 1:63,360 MAY 1979



LAND TYPE ASSOCIATION MAP

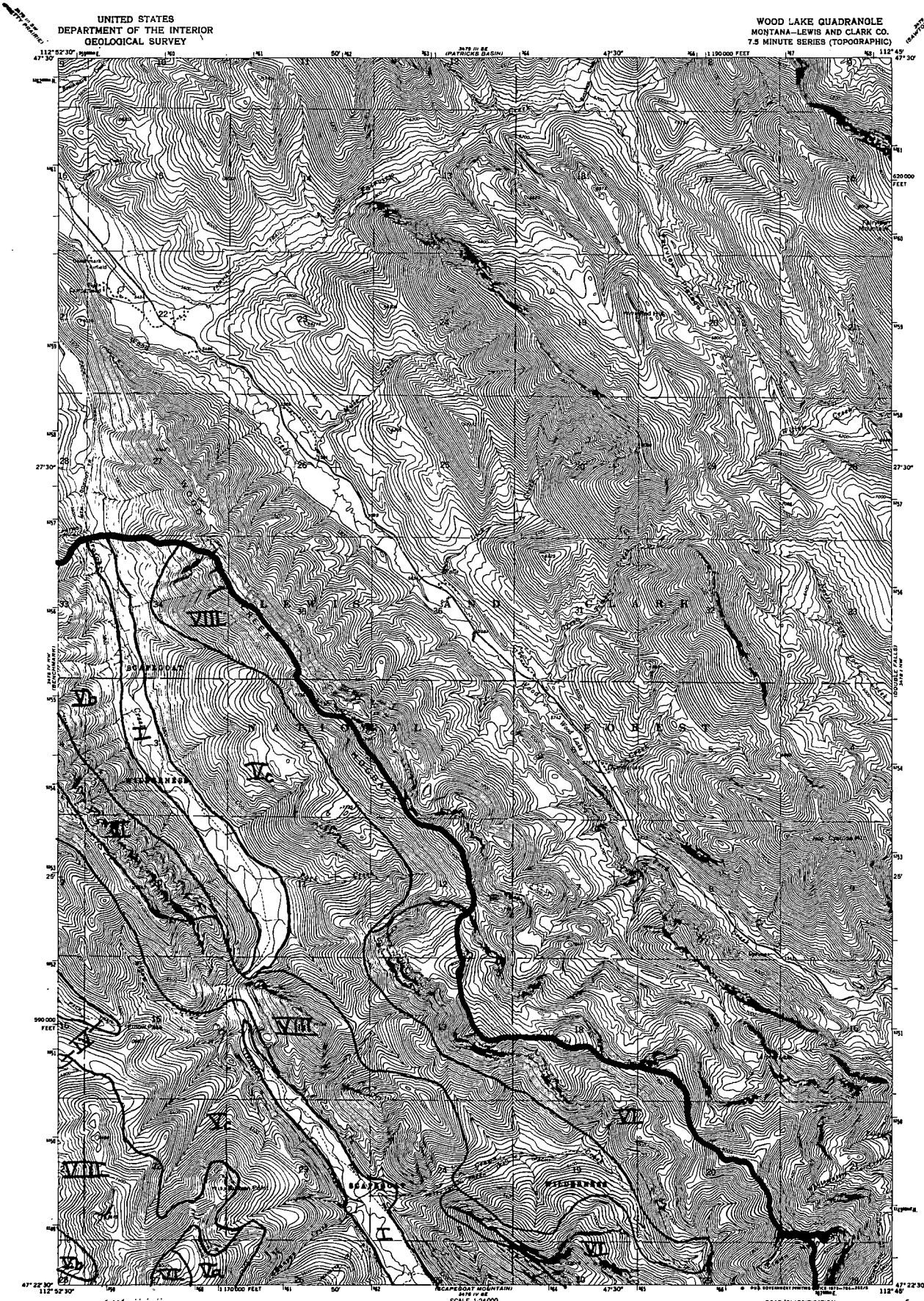
DANAHER-SCAPE GOAT AREA

USFS REGION 1

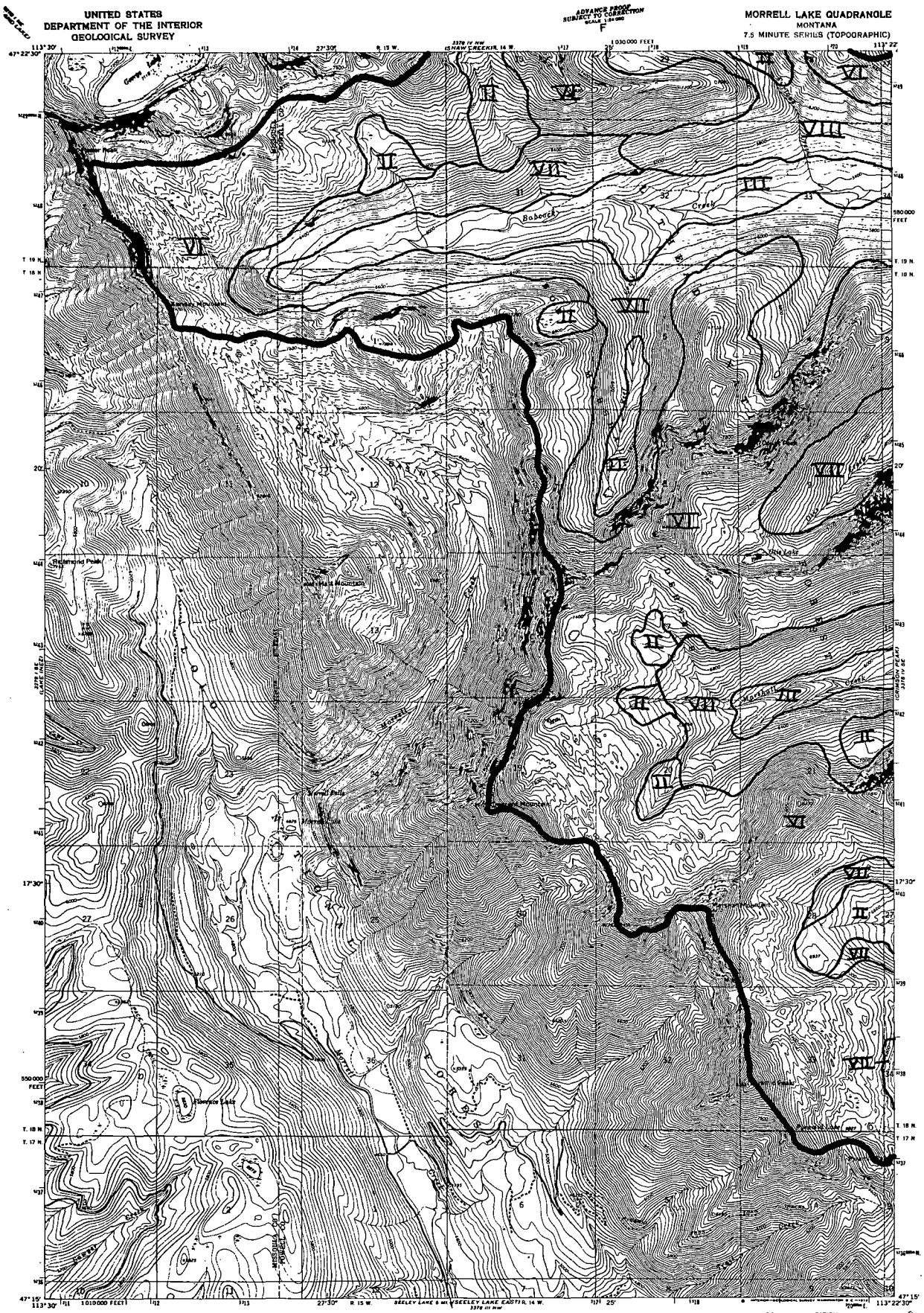
SCALE: 1:63,360 MAY 1979

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS

5



LAND TYPE ASSOCIATION MAP
DANAHER-SCAPE GOAT AREA
USFS REGION 1
SCALE: 1:63,360 MAY 1979



LAND TYPE ASSOCIATION MAP

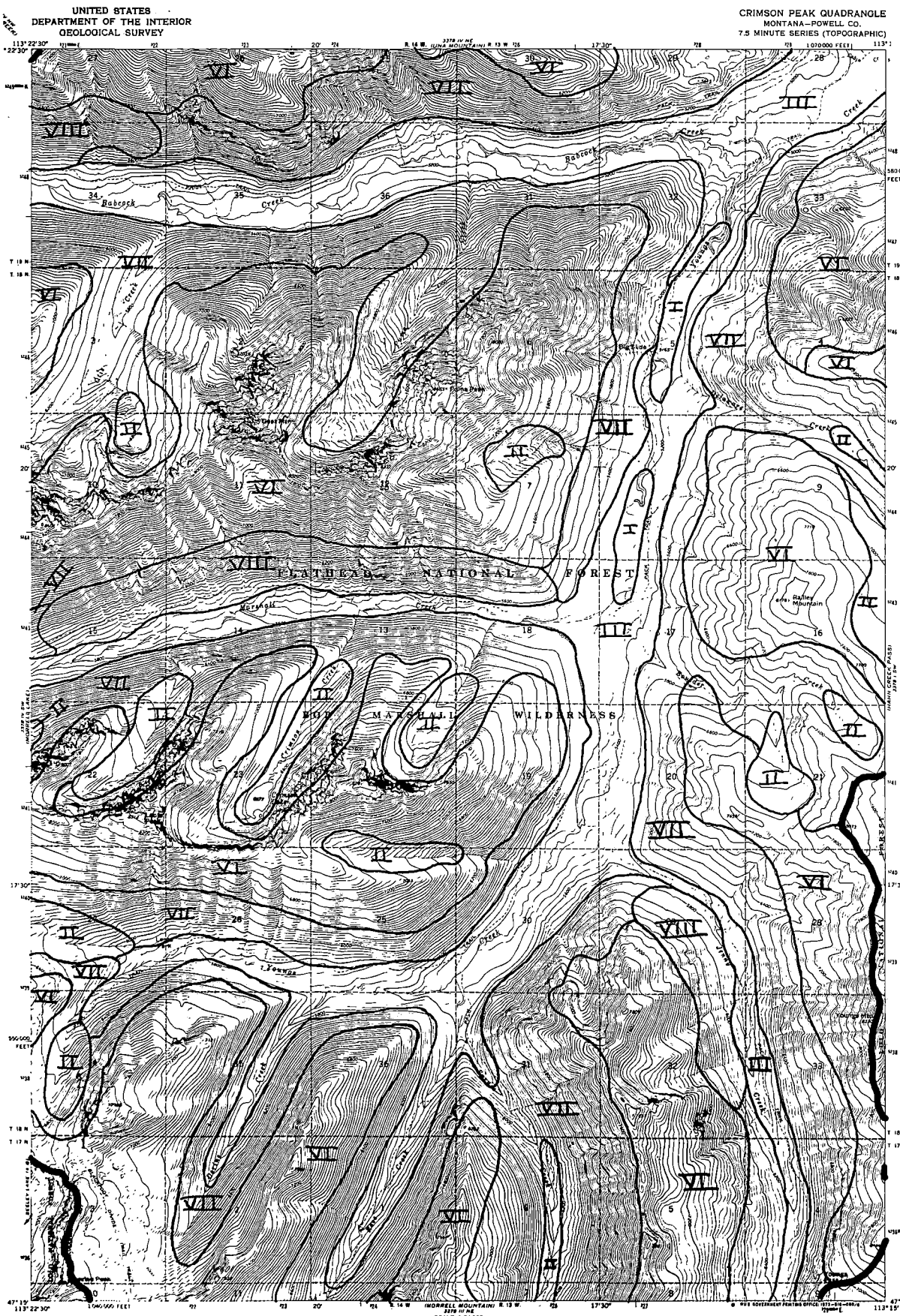
DANAHER-SCAPE GOAT AREA

USFS REGION 1

SCALE: 1:63,360 MAY 1979

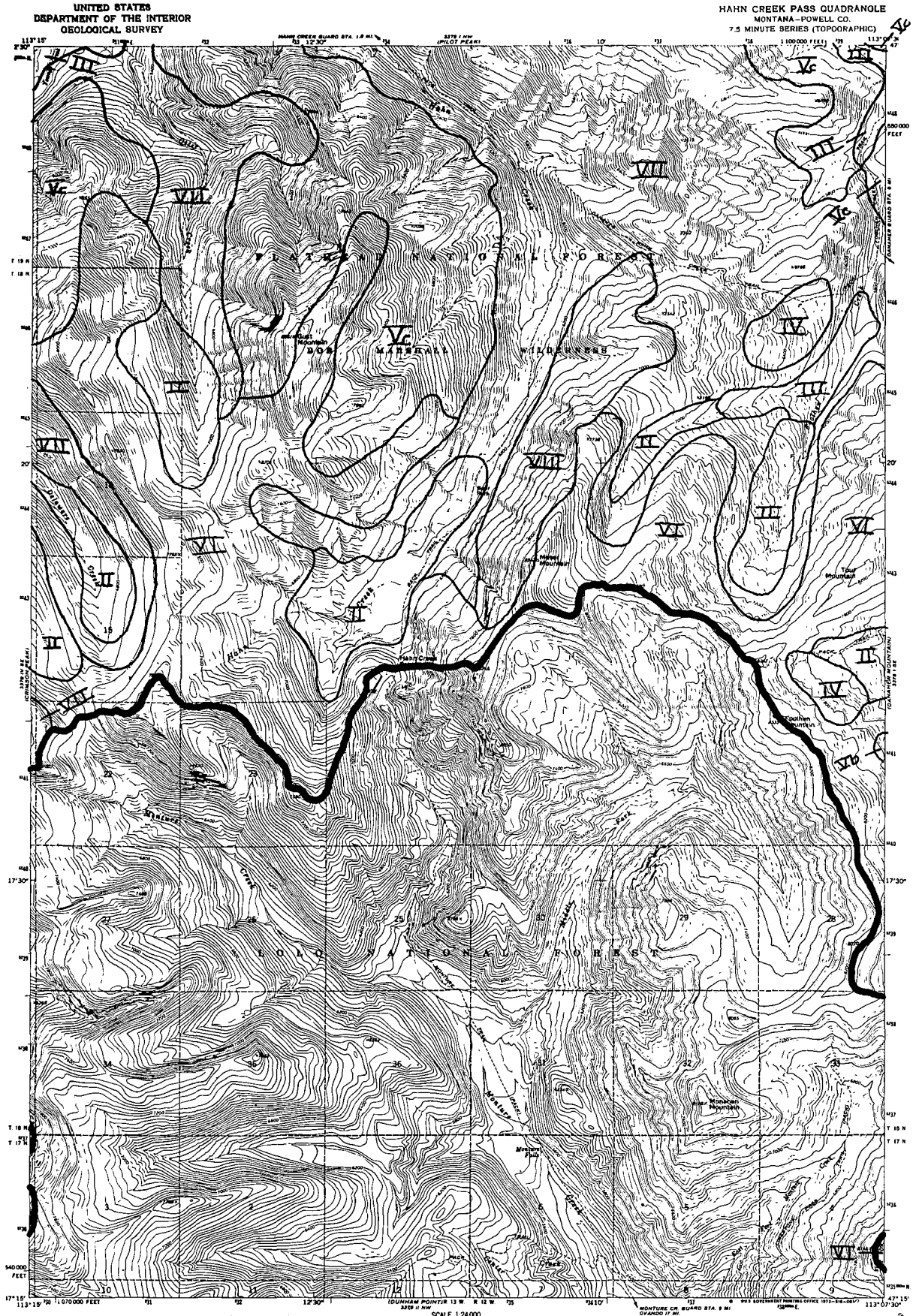
124

7



LAND TYPE ASSOCIATION MAP
DANAHER-SCAPEGOAT AREA
USFS REGION 1
SCALE: 1:63,360 MAY 1979

8



LAND TYPE ASSOCIATION MAP

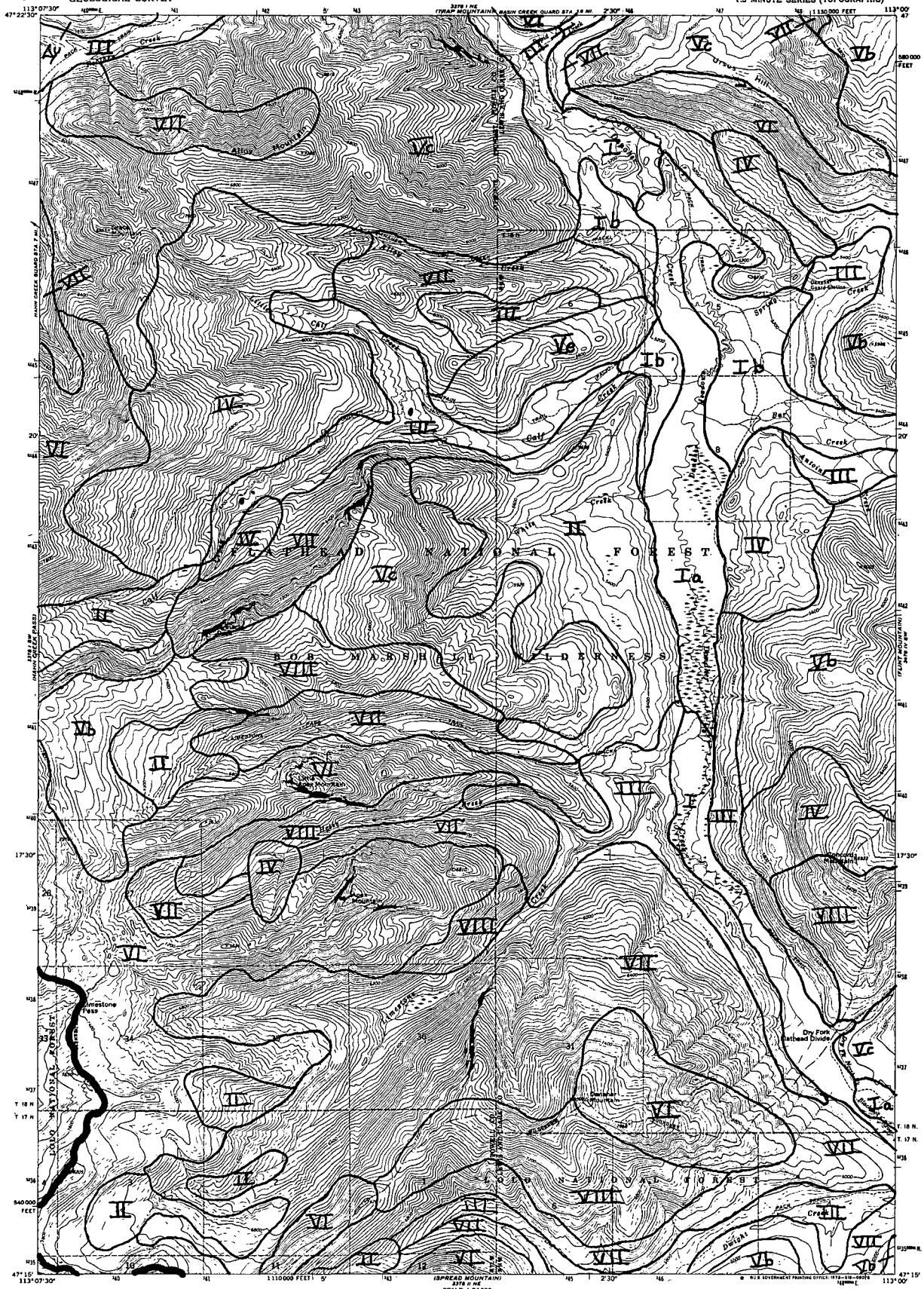
DANAHER-SCAPE GOAT AREA

USFS REGION 1

SCALE: 1:63,360 MAY 1979

HAHN CREEK PASS,

9



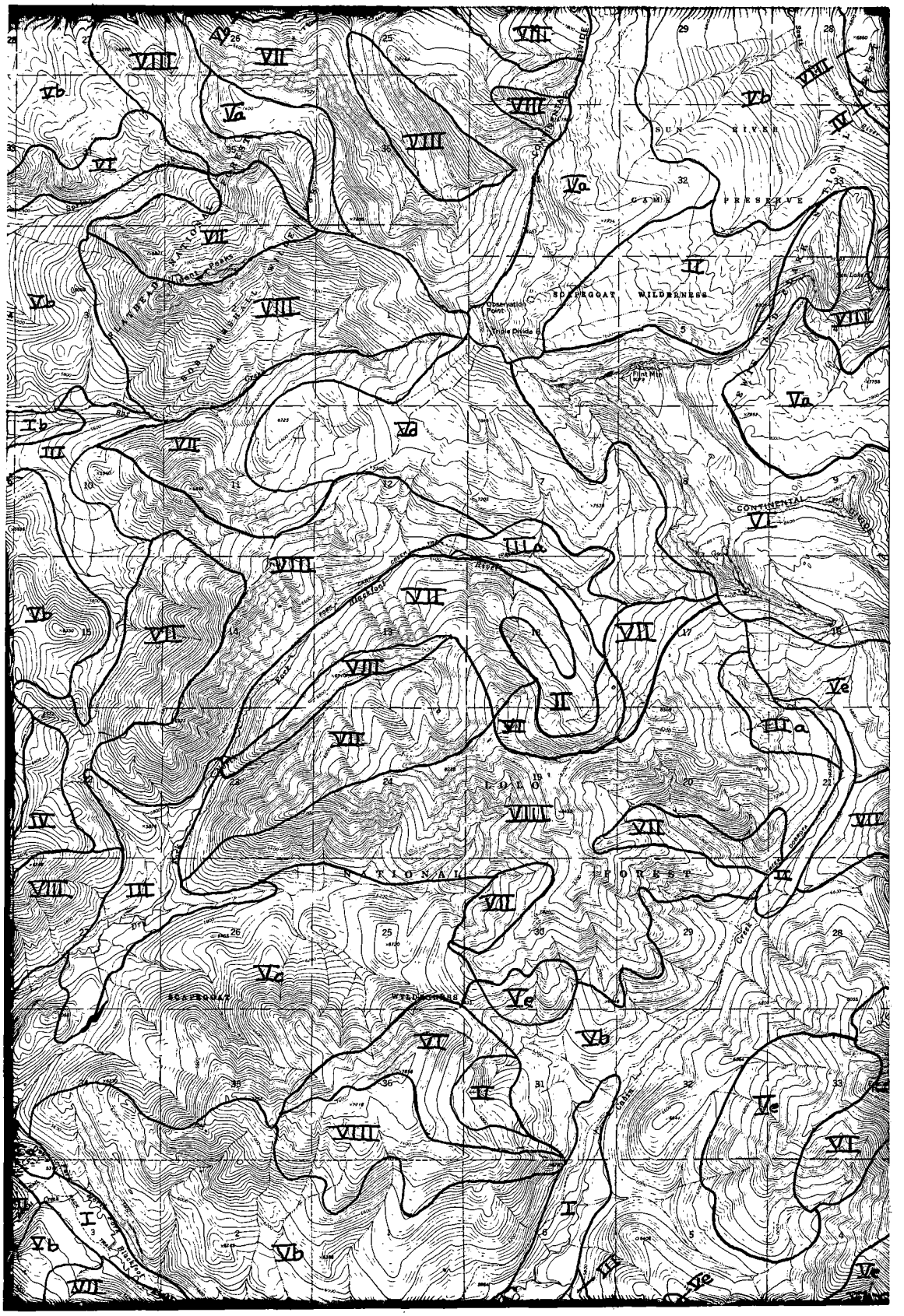
LAND TYPE ASSOCIATION MAP

DANAHER-SCAPE GOAT AREA

USFS REGION 1

SCALE: 1:63,360 MAY 1979

10



LAND TYPE ASSOCIATION MAP

DANAHER-SCAPE GOAT AREA

USFS REGION 1

SCALE: 1:63,360 MAY 1979

11

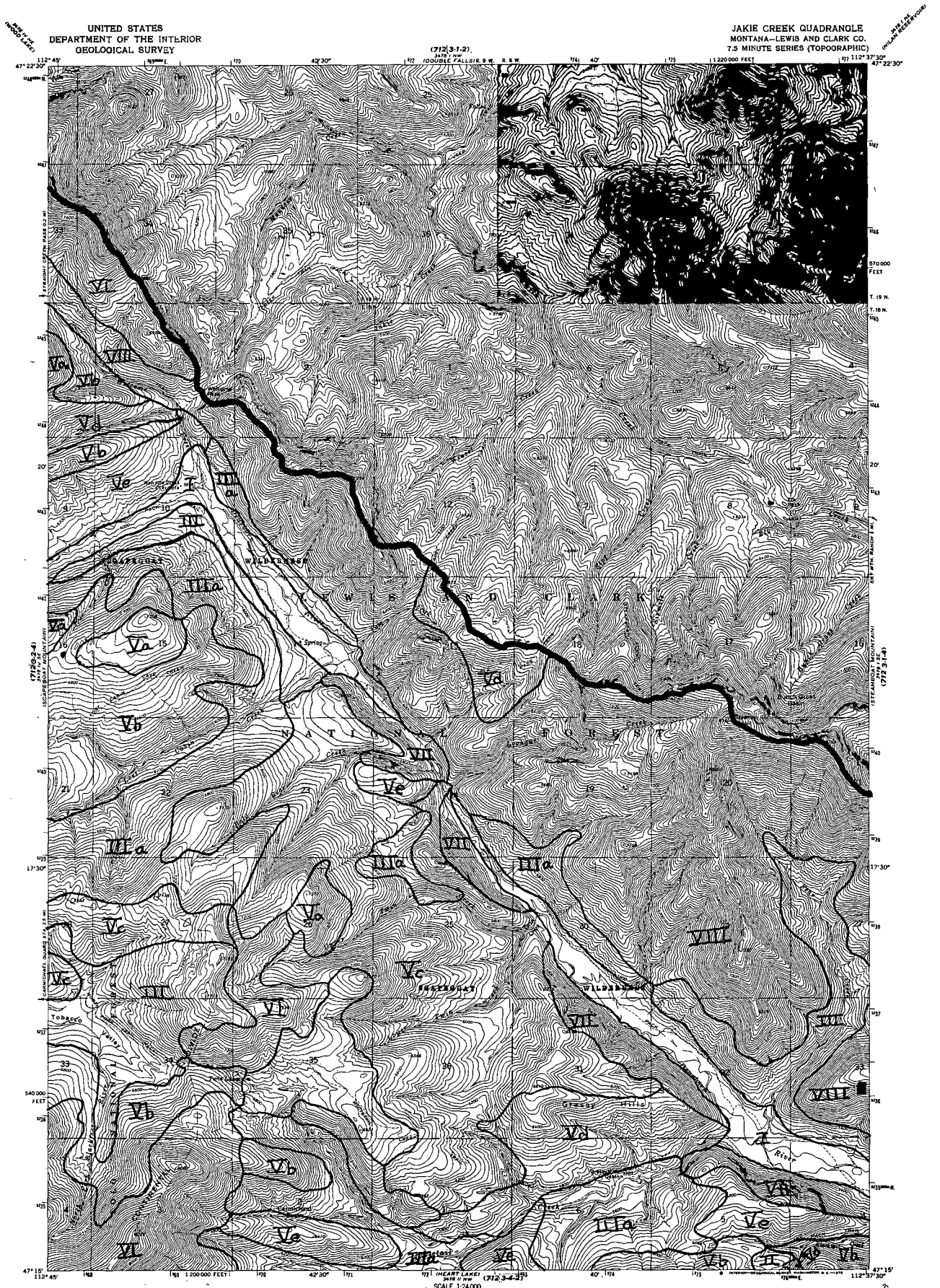
LAND TYPE ASSOCIATION MAP

DANAHER-SCAPE GOAT AREA

USFS REGION 1

SCALE 1:63,360 MAY 1979

12



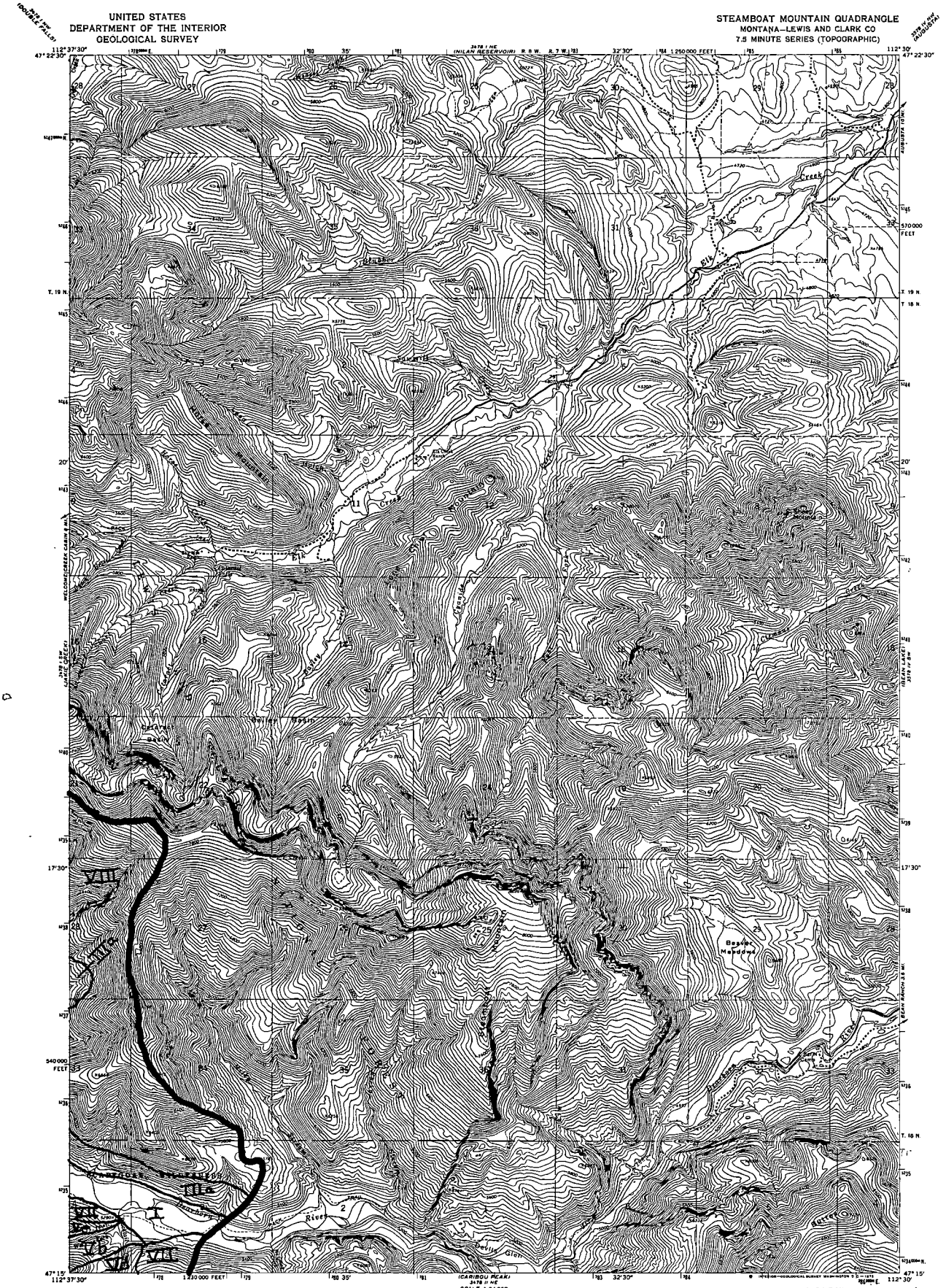
LAND TYPE ASSOCIATION MAP

DANAHER-SCAPE GOAT AREA

USFS REGION 1

SCALE: 1:63,360 MAY 1979

13



LAND TYPE ASSOCIATION MAP

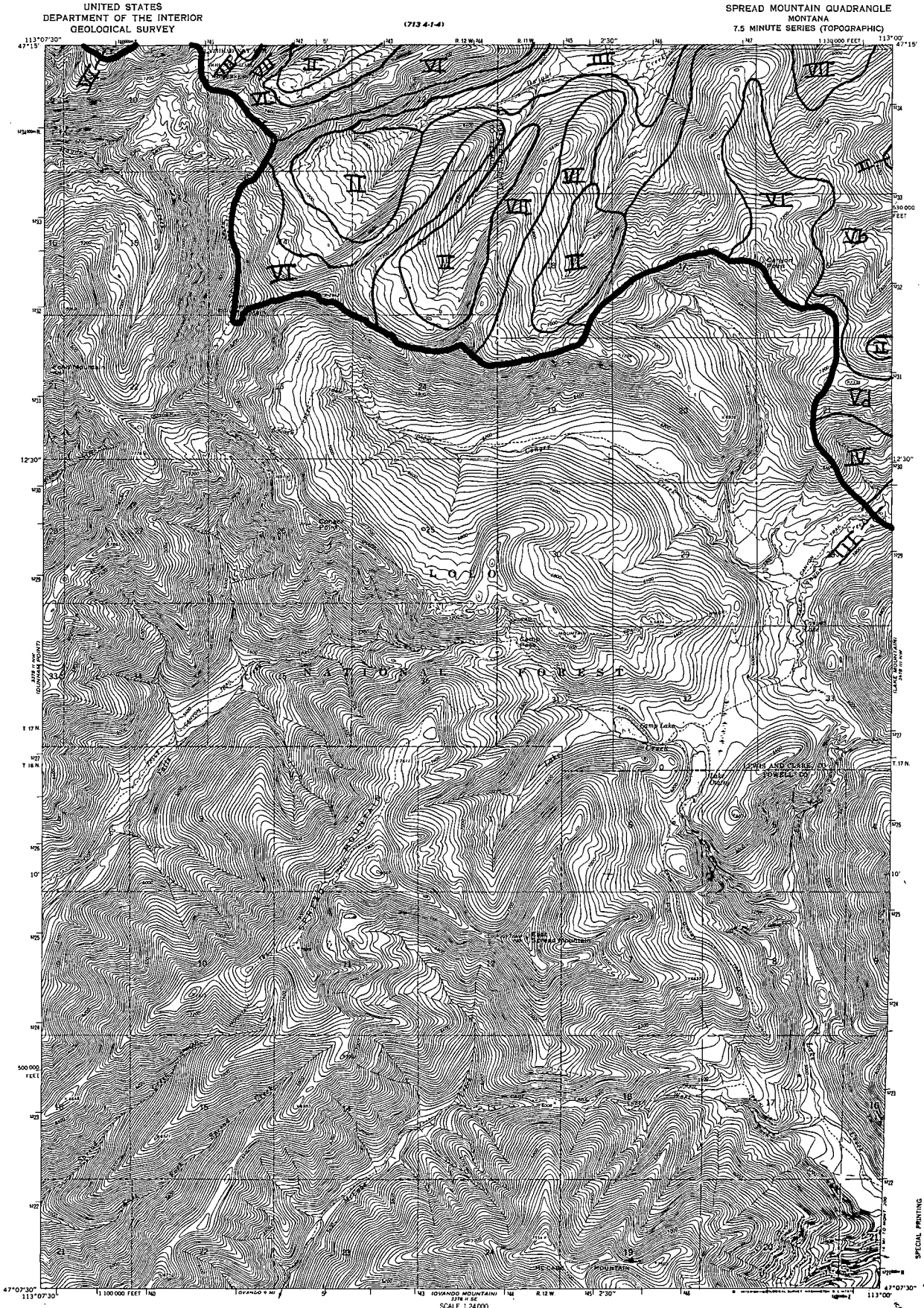
DANAHER-SCAPE GOAT AREA

USFS REGION 1

SCALE: 1:63,360 MAY 1979

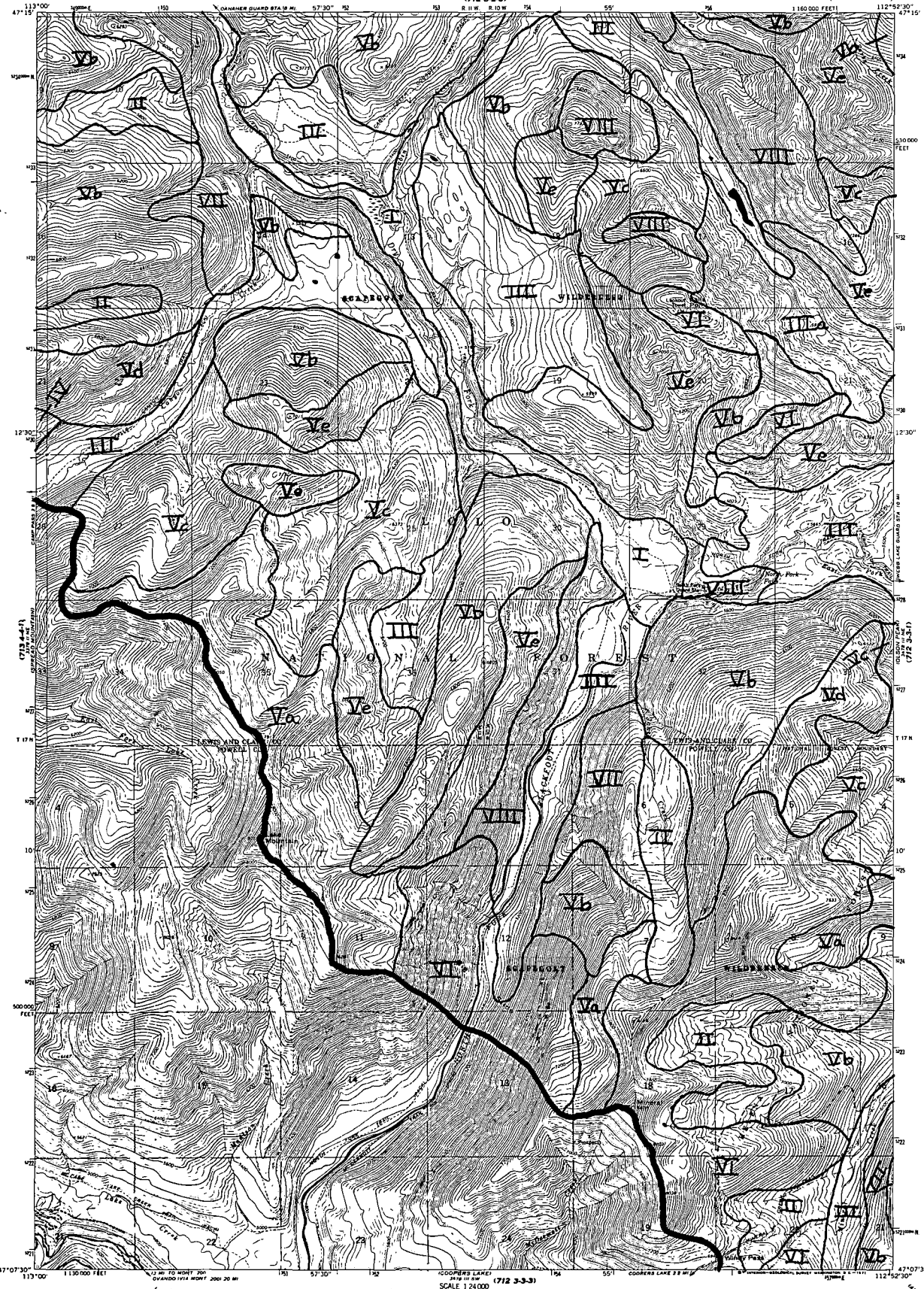
1270

14



LAND TYPE ASSOCIATION MAP
DANAHER-SCAPE GOAT AREA
USFS REGION 1
SCALE: 1:63,360 MAY 1979

15

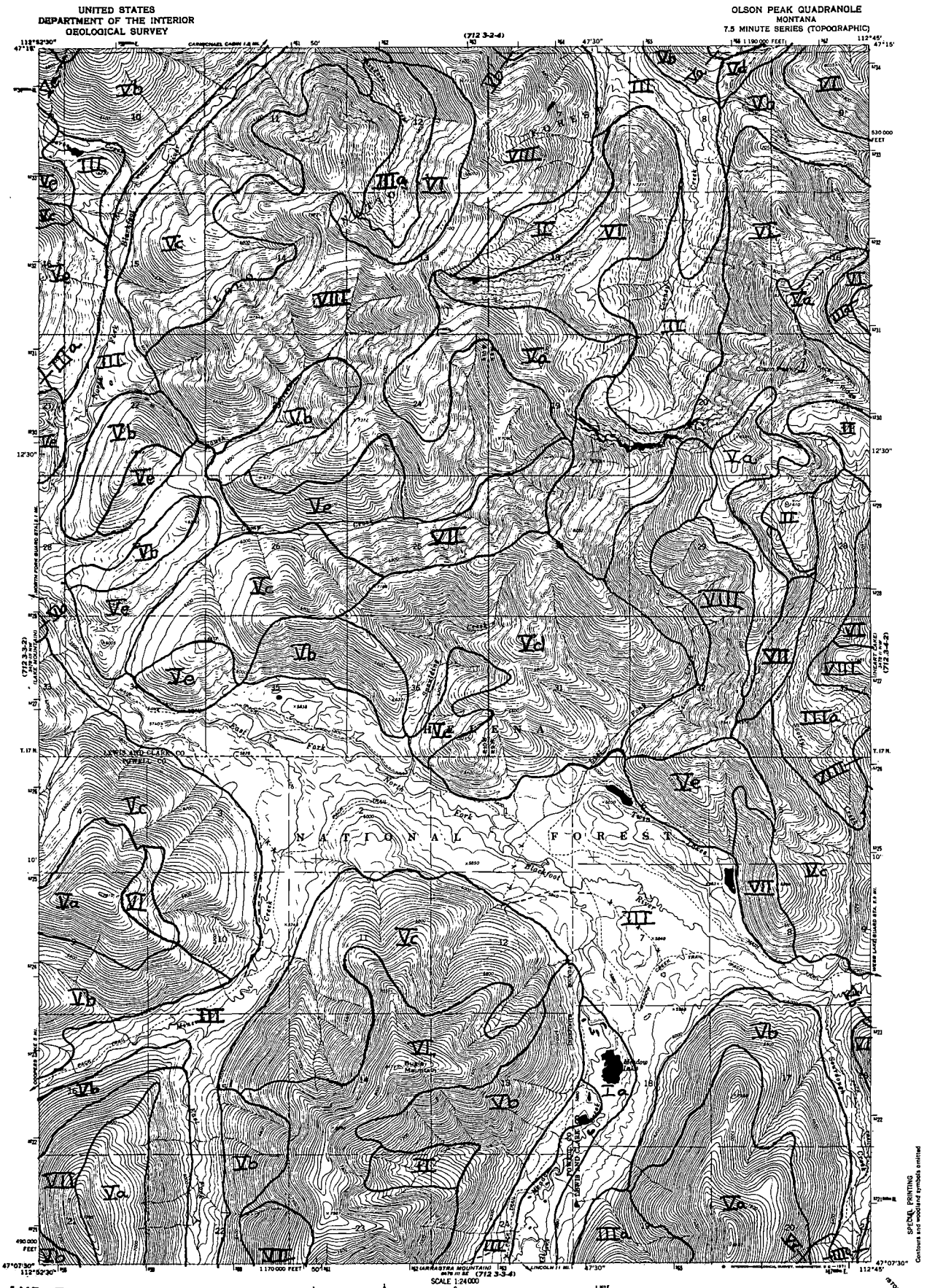


LAND TYPE ASSOCIATION MAP
DANAHER-SCAPE GOAT AREA
USFS REGION 1

SCALE: 1:63,360 **MAY 1979**

136

16

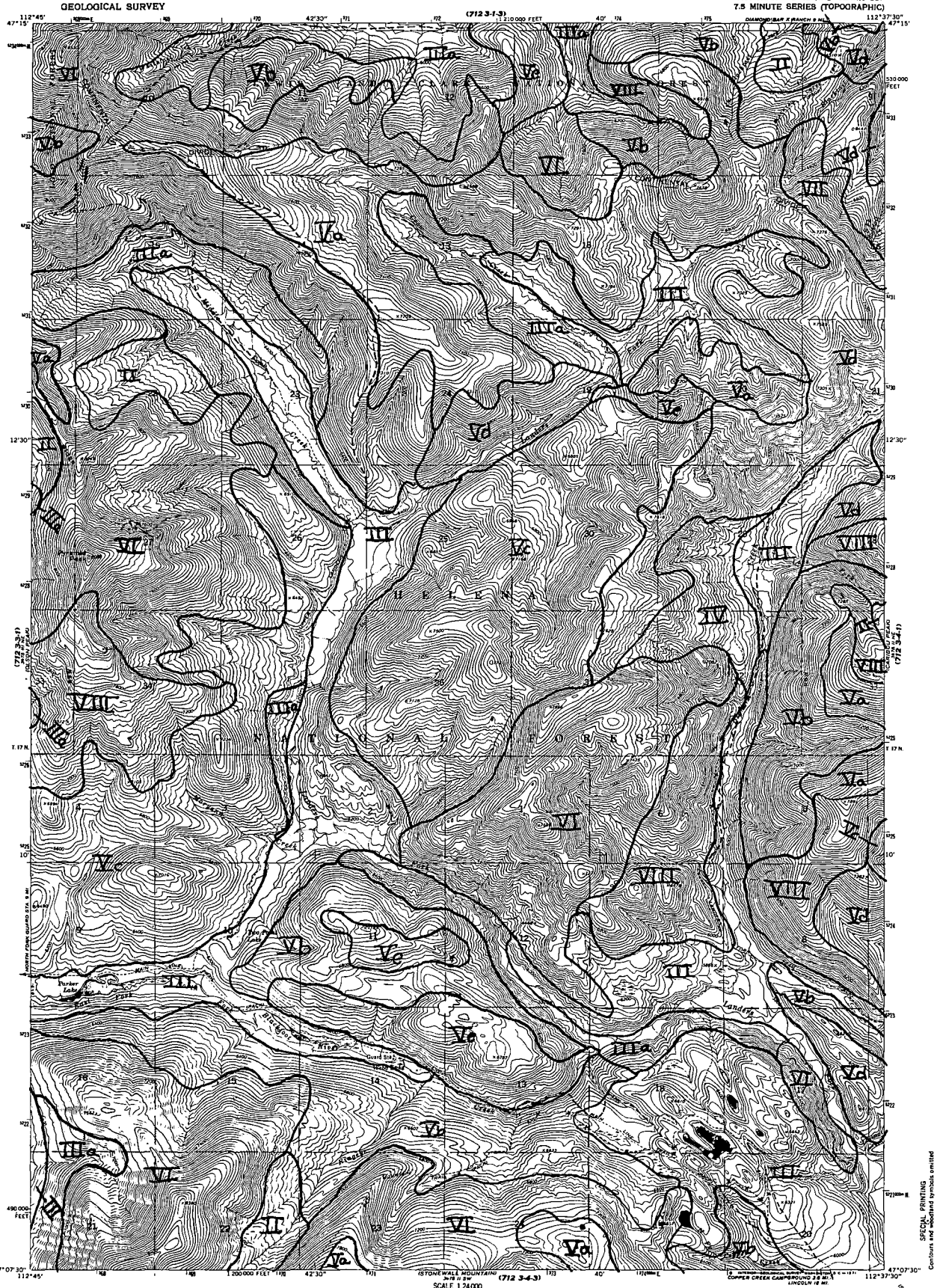


LAND TYPE ASSOCIATION MAP

DANAHER-SCAPE GOAT AREA

USFS REGION 1

SCALE: 1:63,360 MAY 1979

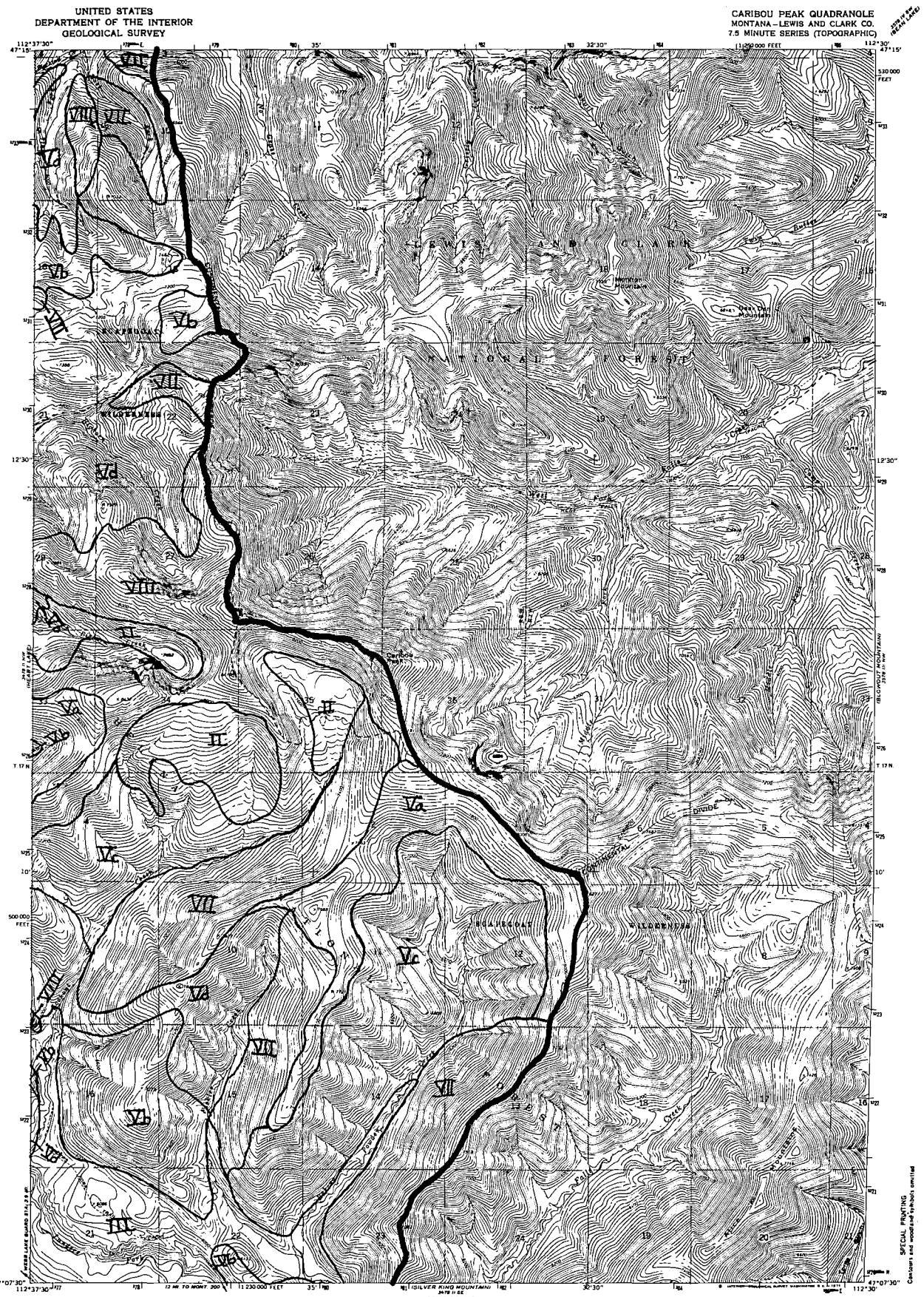


LAND TYPE ASSOCIATION MAP

DANAHER-SCAPEGOAT AREA

USFS REGION 1

SCALE: 1:63,360 MAY 1979



LAND TYPE ASSOCIATION MAP

DANAHER-SCAPE GOAT AREA

USFS REGION 1

SCALE: 1:63,360 MAY 1979

IN MEMORY OF DANNY ON
May 11, 1924 to January 21, 1979

Silviculturist - Photographer - Friend

Photo By JoAnn Speelman - Missoulian

Danny On participated in the field inventory documenting and describing the vegetation and habitat types portion of the mapping units. Danny completed his hand-written report "Fire Behavior by Habitat Types and the Related Effects" on his last working day prior to his accidental death.